

# OPTICAL SPECTROSCOPY OF LUMINOUS INFRARED GALAXIES I. NUCLEAR DATA

D.-C. Kim<sup>(1)</sup>, D. B. Sanders<sup>(1),(2)</sup>, S. Veilleux<sup>(1),(3),(4)</sup>  
J. M. Mazzarella<sup>(5)</sup>, and B. T. Soifer<sup>(2)</sup>

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<sup>(1)</sup> Institute for Astronomy, 2680 Woodlawn Drive, Honolulu, HI 96822.

<sup>(2)</sup> Palomar Observatory, California Institute of Technology, Downs Lab., Pasadena, CA 91125.

<sup>(3)</sup> Kitt Peak National Observatory, NOAO, P. O. Box 26732, Tucson, AZ 85726

<sup>(4)</sup> Hubble Fellow.

<sup>(5)</sup> Infrared Processing and Analysis Center, MS 100-22, California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA 91125

## Abstract

A spectroscopic survey of a large sample of luminous infrared galaxies [ $\log(L_{\text{ir}}/L_{\odot})^6 \approx 10.5 - 12.5$ ;  $H_0 \approx 75 \text{ km s}^{-1}\text{Mpc}^{-1}$ ] has been carried out using the Palomar 5-m telescope and the University of Hawaii 2.2-m telescope. Long-slit spectra covering  $3750 - 8000 \text{ \AA}$  at a resolution of  $\sim 10 \text{ \AA}$  were obtained of 201 IRAS galaxies, including 115 objects from the IRAS Bright Galaxy Surveys, and 86 objects selected on the basis of their 'warm' far-infrared ( $S_{60}/S_{100}$ ) colors. The methods of observation and data reduction are discussed. An atlas of the spectra extracted from the nuclear region of these objects is presented along with a large number of parameters describing the properties of the emission lines, the stellar absorption lines, and the continuum emission that were measured from the spectra. An analysis of these data is presented in a companion paper (Veilleux *et al.* 1994, Paper II) along with a discussion of the spatial variations of these parameters in a subsample of twenty-three objects.

*Subject headings :* galaxies: nuclei --- galaxies: stellar content -- galaxies: Seyfert --- infrared: sources

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<sup>6</sup>  $L_{\text{ir}} \equiv L(8 - 1000 \mu\text{m})$

## 1. Introduction

Surveys of infrared selected galaxies from the Infrared Astronomical Satellite (IRAS) database have shown that luminous infrared galaxies (LIGs) are an important component of extragalactic objects. The luminosity function for infrared galaxies determined by Soifer *et al.* (1987) for objects in the IRAS Bright Galaxy Survey shows that at luminosities  $\log(L_{\text{ir}}/L_{\odot}) \gtrsim 11$ , infrared selected galaxies become more numerous than optically selected starburst and Scyfert galaxies of comparable bolometric luminosity, and at the highest luminosities,  $\log(L_{\text{ir}}/L_{\odot}) > 12$ , they exceed the space densities of QSOs by a factor of 1.5-2 (Sanders *et al.* 1989). Luminous infrared selected galaxies are typically characterized by a strong ‘infrared excess’,  $L_{\text{ir}}/L_B \sim 2 - 80$ , and are grossly underrepresented in optical galaxy catalogs. Ground-based studies of large samples of LIGs have only become possible since their identification in recently completed redshift surveys of extragalactic sources in the IRAS database.

One of the first large scale flux-limited surveys of extragalactic IRAS sources was the IRAS Bright Galaxy Survey, that included sources brighter than 5.24 Jy at  $60\mu\text{m}$  (Soifer *et al.* 1986). Since these objects are the brightest infrared galaxies, they are also the most accessible for detailed observations at other wavelengths. This paper presents the data from the first comprehensive spectroscopic survey of optical emission from luminous galaxies in the IRAS Bright Galaxy Surveys supplemented by an additional large sample of luminous infrared galaxies at fainter flux levels in the IRAS database. The detailed analysis of these data is contained in Veilleux *et al.* (1994, Paper 11).

## 2. The Surveys

Two redshift surveys of extragalactic sources were initiated at Palomar Observatory at the beginning of the IRAS post-mission period. The most extensive and thorough survey was the original IRAS BGS (Soifer *et al.* 1986, 1987, 1989) which has recently been extended to the entire sky using the University of Hawaii 2.2-m telescope of the Mauna Kea Observatory (MKO) and the 2.2m telescope of CASLEO, in Argentina (Sanders *et al.* 1994a). The primary focus of this paper is on the BGS sources with  $\log(L_{\text{ir}}/L_{\odot}) > 11$ . A second more limited redshift survey was begun to further explore the optical emission properties of luminous infrared extragalactic sources down to the faintest flux levels in the original IRAS Point Source Catalog (1985, PSC). The second survey used a ‘warm’ ( $60\mu\text{m} / 100\mu\text{m}$ ) color criterion to pre-select objects that were expected to be luminous in the infrared based on the preliminary analysis of IRAS data for previously known objects. The ‘warm’ survey also served a practical purpose in that it was initially confined to selected grids chosen to fill in the RA observing gaps in the BGS created by the galactic plane. All of the ‘warm’ survey sources chosen for observation from these grids are included in this paper. A second ‘warm’ survey using the same

color criteria, but a higher  $60\mu\text{m}$  limiting flux over the same area of the sky as the original BGS, provided a few additional ‘warm’ objects.

The criteria used to define the full surveys are provided below, followed by a description of the luminous objects from these surveys that are included in this spectroscopic survey.

### *2.1. The IRAS Combined Bright Galaxy Survey -- CBGS*

The objects in the CBGS represent all extragalactic sources with  $S_\nu(60\mu\text{m}) > 5.24 \text{ Jy}$  over the entire sky at galactic latitude  $|b| > 10^\circ$ . The complete CBGS catalog of 550 sources published in Sanders *et al.* (1994b) combines the data from the final analysis of the original BGS (Soifer *et al.* 1989) that included 313 sources brighter than 5.24 Jy at 60pm at galactic latitude,  $|b| > 30^\circ$ , with declination  $\delta > -30^\circ$ , with 242 sources above the same  $60\mu\text{m}$  flux-limit found by extending the survey closer to the galactic plane,  $|b| > 10^\circ$ , and to all southern declinations (Sanders *et al.* 1994a).

### *2.2 The IRA S Warm ( $S_{60}/S_{100}$ ) Galaxy Surveys - WGS*

The WGS is composed of two surveys ( $\text{WGS}_1, \text{WGS}_2$ ), that were constructed using data from the IRAS PSC (1985). Both surveys were initiated at the Palomar 5-m telescope shortly after beginning the BGS, and both used a color criteria,  $S_\nu(60)/S_\nu(100) > 0.25$  to define ‘warm’ far-infrared color. This color selection should not be confused with other definitions of ‘warm’ infrared objects that typically use  $25\mu\text{m}$  data (e.g. 25pm/60pm, or  $12\mu\text{m}/25\mu\text{m}$  colors). These shorter wavelength colors are now known to preselect for AGN-like objects (e.g. Miley, Neugebauer, & Soifer 1985; Vader & Simon 1987; deGrijp, Miley, & Lub 1988; Rush, Malkan, & Spinoglio 1993). The long-wavelength color,  $S_\nu(60)/S_\nu(100)$ , is known to show a strong correlation with total far-infrared luminosity (Soifer & Neugebauer 1990), and is thus more appropriate to select for LIGs.

$\text{WGS}_1$  used a flux limit of  $S_\nu(60) > 0.2 \text{ Jy}$ , near the limit of the original PSC (1985). In addition, the criterion that objects detected at  $25\mu\text{m}$  and  $60\mu\text{m}$  have  $S_\nu(25) < S_\nu(60)$  was used to discriminate against stars. All objects with good quality fluxes at 60pm and good or moderate quality fluxes at  $100\mu\text{m}$ <sup>7</sup> in three  $15^\circ \times 15^\circ$  grids centered at (RA, Dec) = (9h, +35°; 15h, +35°; 22h, -10°) that met the flux limit and color criteria, were tabulated and subsequently examined using finding charts overlayed on the Palomar Sky Survey (POSS) prints. Those objects with unambiguous optical identifications, and that were not associated with known galactic sources, made up the

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<sup>7</sup> For a few of these sources the flux quality at either 60pm or 100pm has subsequently been revised downward. The quality flags tabulated in Table 1b reflect the most recent values listed in the IRAS Faint Source Catalog (Moshir *et al.* 1992, FSC).

final observing list. Of the total of  $\sim$ 300 sources, spectra were obtained for 66 that were select cd at random.

WGS<sub>2</sub> covered a larger portion of the sky (the same region as the original BGS), but with a higher flux-limit,  $S_\nu(60) > 1.5\text{Jy}$ , and a more severe constraint that required both the 60pm and  $100\mu\text{m}$  flux to be of the highest quality. The same color constraints that applied to WGS<sub>1</sub> were also used for WGS<sub>2</sub>. The final observing list included  $\sim$ 80 objects with  $1.5\text{Jy} < S_\nu(60) < 5.24\text{Jy}$  (i.e. that were not already included in the BGS), and spectra were obtained of 20 objects selected without bias, except that they fell within the range of RA available for observations.

### 3. The Spectroscopic Sample

The distribution on the sky of the 115 CBGS sources and 86 WGS sources whose data are in the current paper is shown in Figure 1 and Figure 2; they will be referred to here as the CBGSs and the WGSS respectively.

#### 9.1. The CBGSs

The original intent of the Palomar 5-m optical spectroscopic survey was to obtain systematic coverage in the red and blue of all galaxies in the original BGS (Soifer *et al.* 1987) with  $\log(L_{\text{ir}}/L_\odot) > 11$ , with sufficient sensitivity to detect the main diagnostic emission lines and with sufficient resolution to allow deblending of the H $\alpha$ +N[II] triplet in HII region-like objects and narrow-line AGN. This was essentially achieved in that good quality spectra were obtained for  $\sim$ 90% (8/9) of the original BGS objects with  $\log(L_{\text{ir}}/L_\odot) > 12$ , and  $\sim$ 80% (60/75) of the original BGS objects with  $\log(L_{\text{ir}}/L_\odot) = 11 - 11.99$ . The missing spectra include those with extremely poor signal-to-noise and the few that were missed due to lack of telescope time. These LIGs from the original BGS are being singled out here primarily because published data at other wavelengths is most complete for these objects; this includes ground-based 1– $10\mu\text{m}$  observations (Carico *et al.* 1988, 1990) and millimeterwave CO observations (Sanders, Scoville, & Soifer 1991), in addition to radio continuum observations (Condon *et al.* 1990), and coadded IRAS data (Soifer *et al.* 1989).

However, the expansion of the BGS to southern declinations and closer to the galactic plane, and our ability to obtain high resolution spectra at MKO with sensitivity comparable to that achieved at Palomar, has permitted us to include a substantial number of LIGs down to declinations  $\delta > -40^\circ$  from the BGS extension list of Sanders *et al.* (1994a). This paper includes data for  $\sim$ 60% (3/5) of the objects with  $\log(L_{\text{ir}}/L_\odot) > 12$  and  $\sim$ 20% (11/56) of the objects with  $\log(L_{\text{ir}}/L_\odot) = 11 - 11.99$  in the BGS extension list with  $\delta > -40^\circ$ . Future publications of our ground-based observations of BGS sources will include a similar combination of data for sources in the original BGS and

the sources in the BGS extension with  $\delta > -40^\circ$ . In addition Condon *et al.* (1994) have recently obtained radio continuum observations of all objects in the BGS extension list at  $\delta > -40^\circ$ .

Figure 3 shows the distribution of all of the BGS sources in the current spectroscopic survey, illustrating that there were no obvious biases in the objects observed as a function of redshift. Figure 3 also shows the clear emphasis on observing LIGs. The ratios (observed/total) in the different luminosity bins would be higher for the original BGS sources and lower for the BGS extension sources as described above. Figure 3 also shows the much smaller number of lower luminosity sources that are also included as part of the survey. Some of these sources were in the original LIG list, but fell just below the  $\log(L_{\text{ir}}/L_\odot) = 11$  cutoff when more accurate IRAS fluxes were determined. Others were observed when no other non-observed LIGs remained at a particular RA. They are included here since the data were obtained in the same manner as for the more luminous galaxies, and because it was not our original intent to use a sharp cutoff at  $\log(L_{\text{ir}}/L_\odot) = 11$ , but rather to observe objects at higher luminosity first and observe lower luminosity objects as time permitted. However it is obvious that the percentage of lower luminosity infrared objects observed is small ( $\sim 14\%$ ) and we acknowledge that our sample is highly incomplete for luminosities  $\log(L_{\text{ir}}/L_\odot) < 11$ .

### 3.2. The WGSs

In contrast to the rather detailed description of how sources were chosen for observation from the CBGS, the observation of sources in the WGS was relatively straightforward. All sources were observed at Palomar during the period 1985-87, and all of the good quality observations are included in this paper. Good spectra were obtained for  $\sim 22\%$  (66/300) of the WGS<sub>1</sub> sources and  $\sim 25\%$  (20/80) of the WGS<sub>2</sub> sources. Sources were selected at random from the WGS<sub>1</sub> grids, and sources from the WGS<sub>2</sub> were chosen at random within the range of RA available for observing.

### 3.3. Redshift distribution

The selection criteria used in the definition of the CBGS and WGS introduce a clear bias in redshift between the two samples. Figure 4 shows the redshift distribution of the objects from these two samples whose spectra are presented in this paper. The median recession velocity for the CBGSs objects is  $5,900 \text{ km s}^{-1}$  while it is  $20,300 \text{ km s}^{-1}$  for the WGSs objects,

The original intent in defining the WGS was to preselect a sample of LIGs, and Figure 5 shows that this was indeed achieved. In addition, Figure 5 shows that the luminosity distribution of the WGS is very close to that of the objects observed from the CBGSs. The median  $\log(L_{\text{ir}}/L_\odot) = 11.28$  and  $11.32$  for the CBGSs and WGSs respectively. Although the data for the CBGSs and WGSs is kept separate in the Tables,

the similarity in infrared luminosities for the two samples will allow us to combine these data for the full analysis of the properties of luminous infrared galaxies to be presented in Paper II.

#### *3.4. Source lists and infrared properties*

Table 1a and Table 1b list respectively the CBGSS and WGSS objects in order of right ascension. The content of these tables is as follows:

Column (1). - Source name (following Sanders *et al.* 1994b - CBGS, and this paper - WGS). Priority in the nomenclature was given to objects listed in the New General Catalog (NGC - Sulentic & Tifft 1973), the Uppsala General Catalog (UGC -- Nilsson 1973), the European Southern Observatory Catalog (ESO -- Lauberts 1982), the Morphological Catalog (MCG - Vorontsov-Vel'yaminov, Archipova, & Krasnoyorskaja 1962-74), the Catalog of Galaxies and Clusters of Galaxies (2w -- Zwicky *et al.* **1961-1968**), and the IRAS Galaxies (IR -- IRAS PSC Ver II 1988). IRAS sources which represent galaxy pairs or large galaxies with smaller companions have suffixes indicating the relative position of both objects (e.g., h<sup>T</sup>W, SE, etc) with respect to the center of the IRAS position.

Columns (2) and (3). - The right ascension and declination of the IRAS source in 1950 coordinates (CBGS - Sanders *et al.* 1994b; WGS - IRAS FSC Ver II 1992).

Columns (4) and (5). - The galactic longitude and latitude of the IRAS source in 1950 coordinates.

Column (6). - The barycentric recession velocity as measured from the stronger optical emission lines of the nuclear spectra.

Columns (7) through (10). -- The 12, 25, 60, and 100  $\mu\text{m}$  IRAS flux densities.  $S_{\nu}$ , in units of Jy. (CBGS - Sanders *et al.* 1994b; WGS -- IRAS FSC Ver 11 1992).

Column (11) - The flux quality for each of the IRAS bands for objects in the WGS as taken from the IRAS FSC Ver II (1992). The first number refers to the 12  $\mu\text{m}$  flux, the second number to the 25  $\mu\text{m}$  flux, the third number to the 60  $\mu\text{m}$  flux, and the fourth to the 100  $\mu\text{m}$  flux. The code is 1 = upper limit, 2 = moderate quality 3 = high quality. This column is not applicable to objects in the CBGS whose fluxes are assumed to be of high quality as determined from ADDSCAN/SCANPI processing of the IRAS data (see Soifer *et al.* 1989 and Sanders *et al.* 1994a).

Column (12) -- The infrared flux of the source [ $10^{-14} \text{ W m}^{-2}$ ] defined as

$$F_{\text{ir}} = 1.8 \times \{13.56 \times S_{12} + 5.26 \times S_{25} + 2.54 \times S_{60} + 1.0 \times S_{100}\}.$$

The factor of 1.8 was found by Perault (1989), to provide a good approximation ( $\pm 5\%$ ) to the ratio of the S-1000  $\mu\text{m}$  flux ( $\equiv F_{\text{ir}}$ ), and the sum of the flux in all four IRAS

bands (quantity in brackets), for thermal dust emission in the temperature range \*25-300 K and for dust emissivity laws  $\epsilon \propto \lambda^{-\alpha}$  for  $\alpha$  in the range -0.5 to -2.0. Since many of the high-luminosity galaxies emit a significant portion of their infrared luminosity shortward of 40pm, this expression provides a significantly better determination of the total infrared flux than the more commonly used  $F_{\text{fir}}$  determined by fitting a single temperature dust model of the 60 $\mu\text{m}$  and 100 $\mu\text{m}$  fluxes (cf. Cataloged Galaxies and Quasars Detected in the IRAS Survey 1985).

Column (13) - The logarithm of the infrared luminosity, in units of the bolometric solar luminosity ( $3.83 \times 10^{33} \text{ erg s}^{-1}$ ), computed using the Virgocentric flow model of Aaronson *et al.* (1982). For sources with spectra of two putative nuclei, the mean of the velocities listed in column (6) was used to compute a single distance for the object pair.

Column (14)-- The 12-25  $\mu\text{m}$  color index defined as

$$12/25 = \log(S_{12}/S_{25})$$

Column (15) - The 60-100  $\mu\text{m}$  color index defined as

$$60/100 = \log(S_{60}/S_{100})$$

Column (16) -- Date of observations in the month/day/year format.

Column (17) - Integration time in seconds.

#### **4. Observations and Data Reduction**

##### *4. 1. Data-Taking Procedure*

The majority (163/201 objects = 81 %) of the long-slit spectra presented in the present paper, including 67% of the objects in the CBGSs and 100% of the objects in the WGSs, were obtained with the double spectrograph (Oke & Gunn 1982) on the Palomar 5m telescope. The coverage in the blue was 3500 - 5500 Å at a resolution of  $\sim 8$  Å, while the red spectra covered 5500 - 7800 Å at a resolution of  $\sim 10$  Å. The seeing during the observations typically was 1.0- 1.5 ", and the slit width was 2". For double nuclei, the spectrograph was rotated so that both nuclei were centered in the slit. The data for the remaining 38 objects in the CBGSs, nearly all of which are from the Extended Bright Galaxy Sample (Sanders *et al.* 1994a), were obtained with the Faint object Spectrograph (FOS) on the University of Hawaii 2.2m telescope. A TEK 1024x 1024 CCD detector was used to cover 3500-7500 Å at a resolution of  $\sim 7$  Å. The seeing for these observations was generally 1" or less, and the slit width used was 1.5". The observing

dates of both sets of data are listed in column (16) of Table 1. The atmospheric conditions during the observations were noted in the observing log. Spectra obtained under photometric conditions will be flagged with an asterisk (\*) when relevant (e.g., Tables 2 and 3).

#### 4.2. Reduction Techniques

Standard procedures from the IRAF reduction package were used to reduce the long-slit, data. First, the pixel-to-pixel sensitivity variations of the CCD detector were removed by dividing the original raw image by a sum of high signal-to-noise flat-field frames acquired at the beginning and end of each night. Cosmic rays and cosmetic defects of the detector were removed at this stage. The wavelength scale was established by fitting a 3rd-order polynomial to the emission lines of the spectra of He+Ar and Ne+Ar lamps used to provide wavelength calibration in the blue and red respectively. For the MKO observations, an Fe+Ar calibration lamp was used. At Palomar, calibration lamp spectra were taken before each new source was observed. At MKO, lamp spectra were taken after large slews of the telescope, typically 6-8 times throughout the night. Slight tilts and distortions of the spectra with respect to a straight column of pixels were removed using a 3rd-order polynomial derived along the peak signal of each spectrum.

In order to minimize aperture-related effects, the window used in the extraction of the nuclear spectrum was varied according to the redshift of each object so that it corresponds to an approximately constant *linear* scale of  $\sim 2$  kpc for all of the galaxies with  $cz < 20,000$  km s $^{-1}$  (69% of all of the objects in the sample) and  $\sim 4$  kpc for objects at larger redshift. However, it is important to point out that the effective size of the aperture still has a dependence on redshift since the slit *width* was held constant ("2" - Palomar. 1.5" - MKO) for all of the observations.

Subtraction of the sky was accomplished during the extraction procedure by determining the sky level in regions located far enough from the nucleus to be free from cent aminat ion by the object. The spectra were put onto an absolute flux scale using the spectra of bright flux standards from the list of Oke & Gunn (1982) reduced in exactly the same way as the object spectrum. The resulting object spectrum contained absorption bands near 6870 Å and 7620 Å produced by atmospheric O<sub>2</sub> (the B and A bands, respectively). These features were removed by multiplying the object spectrum by an "atmospheric corrector" derived from the spectrum of a star (generally" the flux standard ) obtained at an airmass similar to the object. The atmospheric corrector is everywhere equal to unity except at the positions of the O<sub>2</sub> bands where it presents the inverse profile of the bands. This correction method is not without fault, and line measurements affected by these atmospheric features will be flagged in Table 2 (cf §3.2 ).

## 5. Results

### 5.1. Spectra

Figure 6 presents the spectra of all the objects listed in Table 1. The spectra are shown as  $f_\lambda$  versus  $\lambda_{\text{observed}}$ . The units of the vertical axis are  $10^{-15} \text{ erg s}^{-1} \text{ cm}^{-2}$   $\text{\AA}^{-1}$  while the wavelength scale is in  $\text{\AA}$ . The spectra have not been smoothed.

### 5.2. Line and Continuum Measurements

The optical spectra presented in Figure 6 contain a wealth of information about the emission-line gas and underlying stellar population in LIGs. Table 2 lists the emission-line fluxes measured from these spectra while Table 3 lists parameters relating to the absorption features, the continuum emission, and the emission line profiles. The line fluxes were measured using two methods. First, the standard plotting package in IRAF(SPLOT) was used to measure the flux of isolated emission lines. To deal with blended lines (e.g.,  $\text{H}\alpha + [\text{N II}] \lambda\lambda 6548, 6583$  and  $[\text{S II}] \lambda\lambda 6716, 6731$ ) and emission lines affected by stellar absorption features ( $\text{H}\beta$  and  $\text{He}\alpha$ ), we used the IRAF procedure SPECFIT<sup>8</sup>. This routine can fit a wide variety of emission-line, absorption-line, and continuum models to the observed spectrum. The input parameters for the fit were determined through SPLOT in IRAF. We chose to fit the continuum with a simple first-order polynomial, and the emission and absorption lines with Gaussian profiles. The actual fitting was done via a chi-square minimization using a simplex algorithm. The output parameters were the flux levels and slopes of the underlying continuum emission, the flux, centroid, and width (FWHM) of the emission lines, and equivalent width, centroid, and width (FWHM) of the absorption lines.

The emission line fluxes listed in Table 2 are normalized to the observed  $\text{H}\alpha$  flux. The uncertainty in these measurements is typically 5–10%. Colons (:) and semi-colons (;) indicate values with relative uncertainties of about 25% and 50%, respectively. The meaning of the other symbols is given at the end of Table 2. Columns (3) and (4) of this table list the value of the  $\text{H}\beta$  flux measured using SPLOT and SPECFIT, respectively. The adopted  $\text{H}\beta$  flux, listed in column (5), is the weighted average of the values obtained from these two methods, with weights estimated from the relative uncertainties in the two types of measurements. Note that the  $[\text{O II}] \lambda 3727$  line sometimes lies near the blue edge of our spectra so the flux for this line is more sensitive to uncertainties in the flux calibration. In most objects, the fluxes of many of the fainter emission lines were also measured. The results of these measurements are listed in the notes at the end of Tables 2a, b.

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<sup>8</sup>SPECFIT was developed and kindly made available by Gerard A. Kriss with funding provided by NASA to the Hopkins Ultraviolet Telescope project.

Absorption line strengths are presented in Table 3. Spectra obtained under photometric conditions are flagged with an asterisk (\*). Column (2) of Table 3 lists the equivalent widths of H $\beta$  derived from the fitting method. These measurements are rather uncertain ( $\sim 30\%$ ) because of the generally strong H $\beta$  emission line affecting the profile of this feature. We also looked for the presence of Balmer absorption lines in the blue ( $\lambda \lesssim 4500 \text{ \AA}$ ) section of the spectra. The admittedly subjective results of this search are listed in column (3). A colon (:) in this column indicates inconclusive evidence for absorption features. Columns (4) and (5) list the equivalent widths of the Mg I $b$   $\lambda 5174$  and Na ID  $\lambda 5896$  absorption lines, respectively. Note that the Na ID feature is blended with the emission line of He I at  $\lambda 5876$  in some galaxies (these measurements are followed by a letter "b" in Table 3). The intensity levels of the continuum near H $\beta$  and H $\alpha$  are listed in columns (6) and (7) as C4861 and C6563, respectively. Finally, the last column of Table 3 lists the values of the line widths (FWHM) of [0 III]  $\lambda 5007$ . This line was selected for line width measurements because it is strong in most LIGs and free of any nearby emission or absorption lines (in contrast to H $\alpha$ ). The line widths listed in Table 3 have been corrected for the finite instrument resolution of the data (7 -10  $\text{\AA}$ ) using the quadrature method. This method assumes that the intrinsic and instrument profiles are Gaussian and gives corrected widths that are too large for profiles which are more pesky than Gaussians (e.g., the emission-line profiles in AGN – Whittle 1985; Veilleux 1991). For this reason, the [0 III]  $\lambda 5007$  line widths should be treated with caution.

## 6. Summary

We have presented the data from the first comprehensive spectroscopic survey at optical wavelengths of the luminous infrared galaxies in the IRAS Combined Bright Galaxy Survey supplemented by an additional large sample of luminous infrared galaxies at fainter flux levels in the IRAS database. In order to minimize aperture-related effects, the window used in the extraction of the nuclear data from the long-slit spectra was varied according to the redshift of each object so that it corresponds to an approximately constant linear scale. An atlas of the nuclear spectra extracted using this method is shown in Figure 6. The fluxes of essentially all of the emission lines detected in these nuclear spectra were measured along with the equivalent widths of many absorption features. For kinematic purposes, the line widths of [0 III]  $\lambda 5007$  were estimated in most of these objects. Finally, the slopes of the continuum emission between H $\beta$  and H $\alpha$  were derived from the continuum levels near these features.

In a companion paper (Veilleux et al. 1994, Paper II), we present the analysis of these nuclear data and a discussion of the spatial variations of the spectral properties in a subsample of twenty-three objects.

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## **Figure Captions**

**Figure 1.** Aitoff projection in Galactic coordinates of objects in the Combined Bright Galaxy Survey whose spectra are included in this paper (CBGSs).

**Figure 2.** Aitoff projection in Galactic coordinates of objects in the Warm Galaxy Survey whose spectra are included in this paper (WGSSs).

**Figure 3.** The redshift distribution of galaxies in the CBGS with  $\log(L_{\text{ir}}/L_{\odot}) > 10.5$ ,  $\delta > -40^{\circ}$ . The shaded region denotes the distribution of galaxies observed in the spectroscopic survey (CBGSs, this paper); the remainder were not observed due to lack of telescope time.

**Figure 4.** Redshift distribution of objects in the spectroscopic survey.

Figure 5, Infrared luminosity distribution of objects in the spectroscopic survey.

**Figure 6.** Reduced spectra –  $f_{\lambda}$  is plotted versus  $\lambda_{\text{observed}}$ : (a) The CBGSs – spectra for the 115 IRAS sources (including 25 observed doubles → 140 spectra) from the CBGS. (b) The WGSS - spectra for the 86 IRAS sources (including 7 observed doubles + 93 spectra) from the WGS.

Table Ia. Infrared Properties of **IRAS Bright** Galaxies

Name	RA(1950)	Dec(1950)	$\ell$	b	cz	F(12)	F(25)	F(60)	F(100)	F.Q.	F(u)	L(ir)	12/25	60/100	obs	date	int
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
NGC 23	000719.4	+25 3846	111.4	-36.0	4557	0.52	1.08	9.20	15.34	51.7	11.04-0.32	-0.22072585	100				
NGC 34	000833.4	-122310	88.8	-72.2	5860	0.40	2.37	16.62	17.16	77.6	11.43 -0.78	-0.01	072585	150			
MCG-0201051S	001618.0	-103914	96.8	-71.6	8173	0.27	1.13	6.88	9.62	36.9	11.40-0.62	-0.15072385	400				
MCG-0201051N	0016 18.0	-10 3914	96.8	-71.6	8082	0.27	1.13	6.88	9.62	36.9	11.40-0.62	-0.15072385	400				
NGC 232	004017.5	-235002	93.7	-85.9	6775	0.33	1.08	10.04	18.34	54.2	11.41 -0.52	-0.26072585	300				
UGC 556	005207.7	+28 5826	123.8	-33.6	4626	0.35	0.43	5.58	10.07	31.5	10.84 -0.08	-0.26072385	900				
IC 1623N	010518.0	-174637	145.2	-79.7	6103	0.68	3.57	22.58	30.37	116.2	11.63 -0.72	-0.13072385	300				
IC 1623SE	01 05 18.0	-17 4637	145.2	-79.7	5837	0.68	3.57	22.58	30.37	116.2	11.63 -0.72	-0.13072385	300				
MCG-0304014	<b>010742,0</b>	-170701	146.7	-78.9	10473	0.30	0.85	6.48	10.44	35.611.61	-0.45	-0.21	072385	300			
MCG+0204025	01 1722.8	+14 0553	133.3	-47.9	9529	0.27	1.44	11.14	9.33	49.1	11.66-0.73	0.08	072485	600			
UGC 903	01 1906.5	+17 1952	133.1	-44.7	2439	0.35	0.56	7.36	14.23	40.9	10.39-0.20	<b>-0.29</b>	072485	600			
NGC 520	01 2159.5	+03 3152	138.7	-58.1	2569	0.77	2.87	30.87	45.81	150.6	11.00-0.57	-0.17072585	300				
IR 01364-1042	013624.0	-104225	159.0	-69.9	14518	0.08	0.40	6.16	6.70	25.7	11.76-0.71	-0.04072485	600				
NGC 660	01 4021.6	+13 2342	141.6	-47.3	822	2.42	7.53	65.54	102.CN)	342.6	10.37 -0.49	-0.19072685	300				
111 Zw 35s	<b>014148.0</b>	+16 5107	140.7	-43.9	8442	0.14	0.95	12.55	13.31	52.4	11.58 -0.83	-0.03	072485	400			
III Zw 35N	0141 48.0	+16 5107	140.7	-43.9	8305	0.14	0.95	12.55	13.31	52.4	11.58-0.83	-0.03	072485	400			
NGC 695	014828.1	+22 2010	140.6	-38.2	9497	0.49	0.84	7.69	12.84	43.6	<b>11.61</b> -0.23	-0.22072685	300				
NGC 873	021405.3	-11 3455	178.8	-64.5	3986	0.44	0.75	5.97	11.79	36.9	10.77 -0.23	-0.30072585	300				
NGC 1050	023931.8	+34 3303	147.5	-22.8	4130	0.28	1.30	5.82	8.35	33.9	10.77-0.66	-0.16	121685	600			
NGC 1056	023951.0	+28 2141	150.7	-28.2	1846	0.33	0.48	5.46	9.80	30.8	10.02-0.17	-0.25	121685	600			
NGC 1068	024007.2	401330	<b>172.1</b>	-51.9	132039	7.085	0.04	176.20224	0.00	1652.6	11.46-0.33	-0.10072685	50				
NGC 1083	0243 18.7	-153405	194.9	-61.0	3947	0.32	0.68	7.12	13.79	40.010.80-0.33	-0.29072685	300					
UGC 2238	024333.4	+12 5310	161.3	<1.1	6477	0.40	0.56	7.70	15.28	43.5	11.27-0.15	-0.30072585	400				
IR 02438+2122	024349.2	+21 2244	155.6	-33.9	7204	0.10	0.58	5.74	6.39	25.6	11.13 -0.75	-0.05	072485	600			
UGC 2369	0251 15.6	+14 4601	161.9	-38.5	9511	0.20	1.33	8.14	10.31	40.9	<b>11.58</b> -0.81	-0.10	121585	600			
NGC 1143/44	025239.3	-00 2305	175.9	-49.9	8638	0.28	0.63	5.30	11.34	32.0	11.39-0.36	-0.33	12 1585	600			
UGC 2403	025323.0	+00 2928	175.1	-49.1	4340	0.26	0.77	7.45	11.79	38.5	10.87 -0.47	-0.20072685	300				
NGC 1204	030207.3	-120606	193.5	-55.3	4486	0.08	0.14	<b>1.02</b>	2.19	6.6	<b>10.13</b> -0.26	-0.33	121485	300			
NGC 1266	03 1328.6	-023643	183.7	-47.5	2019	0.12	<b>1.10</b>	12.83	17.07	57.5	10.37 -0.95	-0.12	121485	200			
NGC 1377	033425.7	-21 0358	212.7	-51.9	1855	0.44	1.81	7.25	5.74	39.8	10.14 -0.61	0.10	121485	400			
IR 03359+1523	0335 57.	+15 2306	171.6	-31.1	10643	0.13	0.60	6.20	6.84	27.6	11.51 -0.67	-0.04	121485	600			
UGC 2982	040943.2	+05 2512	186.7	-31.5	5368	0.55	0.78	8.35	16.89	49.9	11.17 -0.15	<b>-0.31</b>	121585	600			
ESO 550-IG025S	04 1906.5	-185548	214.8	-41.3	9593	0.19	0.43	<b>5.75</b>	8.20	27.8	<b>11.43</b> -0.37	<b>-0.15</b>	121485	600			
ESO 550-IG025N	04 1906.5	-185548	214.8	-41.3	9721	0.19	0.43	5.75	8.20	27.8	<b>11.43</b> -0.37	-0.15	1214 85	600			
NGC 1614	04 31 35.8	-084055	204.5	-34.4	4746	1.44	7.29	32.31	32.69	173.1	11.60-0.70	-0.01	12 15 85	600			
IR 0437.5-2514	043335.0	-251406	224.0	-40.1	4959	0.17	0.43	4.99	9.75	27.210.83	-0.39	-0.29	121485	600			
ESO 485-G003	04 3701.0	.241652	223.	] -39.0	4554	0.34	0.57	6.00	10.97	33.9	10.85 -0.23	-0.26	12 1485	600			
IC 398	04 5549.5	--075121	206.8	-28.7	3792	0.20	0.60	5.94	10.14	31.3	10.66 -0.47	-0.23	12 1685	600			
NGC 1797	05 0519.8	-080502	208.2	-26.7	4563	0.33	1.33	8.26	13.28	45.9	10.99-0.61	-0.21	121685	600			
IR 05186-1017	05 1845.7	-1017 40	212.0	-24.7	8506	0.06	0.18	4.96	8.10	22.6	11.23 -0.48	-0.21	121685	900			

Table Ia. Infrared Properties of IRAS Bright Galaxies

Name	RA(1950)	Dec(1950)	$\ell$	b	cz	~(12)	F(25)	F(60)	F(100)	F.Q.	F(ir)	L(ir)	12/25	60/100	obs	date	int
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
IR 05189-2524	051858.6	-252440227	.9-30.3	12767	0.73	3.44	13.67	11.36		74.2	12.10-0.67	0.08	121485	1200			
NGC 2388	072538.2	+33 5520	185.1	22.0	4029	0.45	2.08	16.00	23.66		81.8	11.13-0.66	-0.17	121685	600		
IR 08339+6517	083355.4	+65 1749	150.5	35.6	5728	0.27	1.10	5.90	6.50		31.0	11.02-0.61	-0.04	121685	300		
NGC 2623	083525.2	+25 5548	198.8	34.0	5322	0.21	1.74	23.13	27.88		99.4	11.46-0.91	-0.08	121585	900		
IR 08572+3915	085713.0	+39 1540	183.4	41.0	17482	0.32	1.70	7.43	4.59		36.8	12.08-0.73	0.21	121485	900		
NGC 2785	091202.9	+41 0734	181.0	43.9	2672	0.49	1.02	8.70	16.07		50.3	10.56-0.32	-0.27	121485	600		
UGC 4881 SW	091239.6	+44 3220	176.3	43.9	11795	0.13	0.60	5.96	10.23		30.5	11.65-0.65	-0.23	121585	600		
UGC 4881 NE	091239.6	+44 3220	176.3	43.9	11854	0.13	0.60	5.96	10.23		30.5	11.65-0.65	-0.23	121585	600		
UGC 5101.	093204.6	+61 3437	152.5	42.9	11795	0.25	1.03	11.54	20.23		58.7	11.93-0.62	-0.24	121585	600		
MCG+08 18012	093318.5	+48 41 53	169.8	47.0	7775	0.15	0.65	5.88	8.72		29.3	11.26-0.62	-0.17	12 14 85	600		
NGC 3110	100132.2	-061402246.4	37.4	5062	0.59	1.04	10.70	19.20		60.1	11.20-0.25	-0.25	121485	300			
IR 10565 +2448 Main	105635.5	+24 4843	212.5	64.7	13156	0.22	1.14	12.12	15.13		55.2	12.00-0.72	-0.10070592	300			
IR 10565+2448SE	105635.5	+24 48 43	212.5	64.-/	13097	0.22	1.14	12.12	15.13		55.2	12.00-0.72	-0.10070592	500			
NGC 3508S	110030.7	-1601	12268.6	39.2	3878	0.41	0.89	6.75	13.97		41.5	10.80-0.34	-0.32	121485	300		
NGC 3508N	110030.7	-1601	12268.6	39.2	3856	0.41	0.89	6.75	13.97		41.5	10.80-0.34	-0.32	121485	300		
NGC 3597	11 1214.4	-232718	276.0	34.0	3504	0.64	1.95	12.54	18.06		69.1	10.93-0.49	-0.16	121485	300		
MCG+0029023	111838.6	-024236263.6	52.8	7515	0.33	0.73	5.22	9.65		31.3	11.26-0.35	-0.27	121485	600			
UGC 6436NW	112309.8	+14 5653	240.6	66.5	10324	0.19	0.58	5.93	10.29		31.1	11.54-0.48	-0.24070592	400			
UGC 6436SE	112309.8	+14 5653	240.6	66.5	10237	0.19	0.58	5.93	10.29		31.1	11.54-0.48	-0.24070592	400			
IR 12224-0624	122229.0	-062414	291.3	55.6	2147	0.09	0.37	5.81	7.00		25.1	10.07-0.61	-0.08070692	350			
NGC 4666	124234.6	-001120299.5	62.4	1585	1.60	2.1228	2.20	77.11		182.4	10.66-0.12	-0.44070692	400				
IC 3908	125404.1	-071724305.2	55.3	1284	0.49	0.72	8.46	15.41		47.6	9.90-0.17	-0.26	121485	600			
UGC 8058	125404.8	+57 0838	121.6	60.2	12672	1.87	8.6631	9.99	30.29		182.8	12.49-0.67	0.02072785	300			
NGC 4922	125901.0	+29 3459	78.3	86.9	6825	0.23	1.29	5.73	7.54		32.1	11.19-0.74	-0.12072785	100			
MCG-0233098W	125941.3	-152959306.8	47.0	5162	0.34	1.36	7.38	9.09		39.7	11.02-0.60	-0.09052986	600				
MCG-0233098E	125941.3	-152959	306.8	47.0	5016	0.34	1.36	7.38	9.09		39.7	11.02-0.60	-0.09052986	600			
IC 860	13 J2 40.1	+24 5252	9.0	84.1	3986	0.09	1.27	17.93	18.13		72.1	11.07-1.16	0.00070592	600			
UGC 8335NW	13 J3 41.3	+62 23 17118.0	54.8	9378	0.34	1.95	10.66	11.80		54.0	11.69-0.75	-0.04072785	300				
UGC 8335SE	131341.3	+62 2317	118.0	54.8	9228	0.34	1.95	10.66	11.80		54.0	11.69-0.75	-0.04072785	300			
UGC 8387	13 J8 19.0	+34 2349	82.9	80.6	6711	0.26	1.36	15.44	28.15		75.6	11.54-0.71	-0.21	072785	600		
NGC 5104	131849.2	+00 36 J4	319.2	62.3	5154	0.22	0.79	6.66	12.39		36.6	11.00-0.55	-0.27	070592	500		
NGC 5218	133026.4	+63 01 26	115.1	53.7	2832	0.26	0.91	6.91	14.11		40.1	10.51 -0.55	-0.31	072785	300		
NGC 5256SW	13 36 J4.2	+48 31 52	102.7	67.0	8360	0.23	0.98	7.34	11.07		38.2	11.44-0.63	-0.18072785	300			
NGC 5256NE	13 36 J4.2	+48 31 52	102.7	67.0	8410	0.23	0.98	7.34	11.07		38.2	11.44-0.63	-0.18072785	300			
NGC 5257	13 37 22. ]	+01 05 13	328.8	61.2	6491	0.56	1.23	9.30	19.59		57.5	11.42-0.34	-0.32070592	400			
NGC 5258	13 37 22. I	+010513	328.8	61.2	6829	0.56	1.23	9.30	19.59		57.5	11.42-0.34	-0.3207 0592	400			
UGC 8696	13 42 5].6	+56 08 13108.1	59.7	11585	0.24	2.2821	2.74	21.38		92.4	12.11 -0.99	0.01	070692	600			
NGC 5430	13 5908.4	+59 34 12	107.3	55.6	3106	0.86	1.63	10.41	19.47		62.3	10.78-0.46	-0.27072785	300			
Zw 247.020	141753.8	+49 2754	91.3	62.1	7758	0.15	0.84	5.62	8.00		28.9	11.25-0.74	-0.15	070592	300		
NGC 5653W	14 28 00.2	+31 26 17	49.6	68.1	3632	0.70	1.29	10.95	20.77		65,2	10,92-0.26	-0.28 07	2785	300		

**Table 1a. Infrared Properties of IRAS Bright Galaxies**

Name	RA(1950)	Dec(1950)	$\ell$	b	cz	F(1)	F(2)	F(25)	F(60)	F(100)	F.Q.	F(ir)	L(ir)	12/25	60/100	obs	date	int
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)		
NGC 5653E	142800.2	+31 2617	49.6	68.1	3444	0.70	1.29	10.95	20.77		65.2	10.92-0.26	-0.28	072785	300			
NGC 5676	143101.2	+49 40 37	88.7	60.4	2206	0.71	1.03	9.64	30.66		70.5	10.54-0.16	-0.50072785	300				
IR 14348- 1447SW	143452.3	-144724	337.6	40.624796	0.07	0.49	6.87	7.07		29.2	12.29-0.55	-0.01	070492	600				
IR 14348-1447NE	143452.3	-144724	337.6	40.624654	0.07	0.49	6.87	7.07		29.2	12.29-0.55	-0.01	070492	900				
NGC 5734	144218.4	-203937	335.7	34.7	4107	0.44	0.76	7.25	26.22		54.8	10.97-0.23	--0.56072785	300				
UGC 9618	145447.8	+24 4858	35.0	61.7	10233	0.22	0.43	5.99	15.65		36.3	11.60-0.29	-0.42072785	600				
Zw 049.057	151045.6	+07 2443	8.9	51.0	3516	0.08	0.77	20.76	29.44		88.1	11.04-0.97	-0.15	052986	600,			
I Zw 107s	151619.0	+42 5541	70.3	56.5	11795	0.21	1.39	9.21	10.70		44.5	11.81	-0.82	-0.07	070492	600		
I Zw 107N	151619.0	+42 5541	70.3	56.5	11818	0.21	1.39	9.21	10.70		44.5	11.81	-0.82	-0.07	070492	600		
IR 15250+3609	152503.1	+36 0900	57.8	55.9	16217	0.20	1.32	7.29	5.91		34.2	i	1.98-0.82	0.09070492	600			
NGC 5936	152739.4	+13 09	32	20.1	50.4	4052	0.48	1.25	8.49	16.07		50.9	10.93-0.42	-0.28072785	300			
NGC 5953	153213.4	+15 2143	23.9	50.3	2069	0.53	1.16	10.04	18.97		58.0	10.40-0.34	-0.28072785	300				
UGC 9913W	153246.3	+23 4008	36.6	53.0	5281	0.48	7.91	103.80112.40		427.5	12.10-1.21	-0.03031987	1200					
UGC 9913E	153246.3	+23 4008	36.6	53.0	5406	0.48	7.91	103.80112.40		427.5	12.10-1.21	-0.03031987	1200					
IR 15335-0513	153332.4	-051359	360.0	38.6	8035	0.15	0.51	5.62	8.99		28.2	11.27-0.52	-0.20070592	600				
NGC 6090SW	161024.0	+52 3506	81.4	45.2	8743	0.26	1.11	6.66	8.94		35.4	11.45-0.63	-0.13070492	400				
NGC 6090NE	161024.0	+52 3506	81.4	45.2	8707	0.26	1.11	6.66	8.94		35.4	11.45-0.63	-0.13	070492	400			
IR 161643746	161628.2	-074645	5.7	28.7	6286	0.35	0.56	10.18	13.72		47.6	11.28-0.21	-0.13	070692	500			
MCG+0142088	162827.4	+04 1124	19.3	32.9	7432	0.29	0.77	6.95	12.12		37.9	11.33-0.42	-0.24070592	500				
NGC 6181	163010.1	+19 5548	37.2	39.2	2512	0.54	1.04	8.90	20.04		55.6	10.55-0.29	-0.35072785	300				
NGC 6240	165027.7	+02 2858	20.7	27.3	7371	0.56	3.42	22.68	27.78		111.4	11.79-0.79	-0.09072785	300				
NGC 6285/6NW	165744.9	+59 0040	88.0	37.4	5582	0.33	0.49	7.88	22.59		49.9	11.21	-0.17	-0.46070492	500			
NGC 6285/6SE	165744.9	+59 0040	88.0	37.4	5619	0.33	0.49	7.88	22.59		49.9	11.21	-0.17	-0.4607	04 92 500			
IR 17132+5313W	171314.2	+53 1352	80.6	35.8	15445	0.12	0.62	5.68	8.04		27.5	11.83-0.71	-0.15070592	400				
IR 17132+5313E	171314.2	+53 1352	80.6	35.8	15102	0.12	0.62	5.68	8.04		27.5	11.83-0.71	-0.15	070592	400			
IR 17138-1017	171350.7	-101729	12.2	15.7	5080	0.62	2.07	15.20	18.99		77.2	11.31	-0.53	-0.10070592	600			
IR 17208-0014	172048.2	-001417	22.2	19.4	12814	0.20	1.66	31.14	34.90		126.4	12.34	-0.93	-0.05070592	900			
NGC 6621	181300.1	+68 2053	98.5	28.6	5939	0.27	0.94	6.51	11.82		37.2	11.13-0.54	-0.26070592	500				
IR 18293-3413	18 2922.4	-34 13 43	0.1	-11.3	5400	1.12	3.76	34.19	49.69		172.4	11.71	-0.53	-0.16070592	600			
NGC 6670W	183256.2	+59 5054	89.3	25.4	8492	0.36	1.03	8.24	15.18		46.5	11.54-0.46	-0.27	070592	600			
NGC 6670E	183256.2	+59 50 54	89.3	25.4	8538	0.36	1.03	8.24	15.18		46.5	11.54-0.46	-0.27	070592	600			
NGC 6701	184234.1	+60 3604	90.4	24.4	3878	0.45	1.19	10.11	20.62		58.9	10.95	-0.43	-0.31	070592	350		
ESO 593-IG008S	1911 32.3	-21 2422	16.1	-14.4	13097	0.17	0.48	6.16	9.72		30.4	11.74	-0.44	-0.20070592	600			
ESO 593-IG008N	191132.3	-21 2422	16.1	-14.4	13024	0.17	0.48	6.16	9.72		30.4	11.74-0.44	-0.20070592	600				
IR 19297-0306	192942.5	-040634	34.0	-10.9	25143	0.13	0.59	7.05	7.72		30.7	12.32-0.67	-0.04	070492	1500			
NGC 6926	:03030.4	-021152	43.2	-23.4	5760	0.36	0.51	5.59	14.33		36.2	11.09-0.15	-0.41	070592	400			
Zw 448 020Main	205505.3	+16 5603	63.9	-18.1	10635	0.25	2.39	13.28	10.57		60.6	11.86-0.97	0.10	070492	400			
Zw 448.020NW	205505.3	+16 5603	63.9	-18.1	10772	0.25	2.39	13.28	10.57		60.6	11.86	-0.97	0.10070492	600			
ESO 286 IG019	20 55 09.3	-42 5038	358.6	-40.8	12901	0.28	1.91	12.78	9.95		56.6	11.99-0.83	0.11	070592	600			
ESO 343-IG013S	2133 05.6	-38 4603	4.4	-47.9	5550	0.28	0.88	5.86	8.91		32.3	11.03-0.50	-0.18	070592	600			

Table 1a. Infrared Properties of IRAS Bright Galaxies

Name (1)	RA(1950) (2)	Dec(1950) (3)	$\ell$ (4)	b (S)	cz (6)	F(12) (7)	F(25) (8)	F(60) (9)	F(100) (10)	F.Q. (11)	F(ir) (12)	L(ir) (13)	12/25 (14)	60/100 (15)	obs (16)	date (17)	int
ESO 343-IG013N	21 3305.6	-384603	4.4	-47.9	5792	0.28	0.88	5.86	8.91	32.3	11.03	-0.50	-0.18	070592	600		
IC 5135	2145 19.7	-351104	9.9	-50.4	4321	0.59	2.12	16.48	25.57	86.9	11.22	-0.56	-0.19	070592	400		
IC 5179	2213 12.9	-37 0539	6.5	-55.9	4987	1.14	2.22	18.98	36.27	112.1	11.45	-0.29	-0.28	072385	400		
ESO 602-G025	22 2842.7	-19 1731	39.5	-56.9	7455	0.29	0.76	5.97	10.21	33.5	11.28	-0.42	-0.23	070492	400		
ESO 534-G009	2235 S6.3	-260638	27.8	-60.4	3323	0.27	0.48	6.03	12.56	34.2	10.58	-0.25	-0.32	072385	300		
UGC 12150	223853.6	+33 5912	94.4	-21.3	6670	0.36	0.79	8.17	14.16	44.2	1.30	-0.34	-0.24	070592	350		
IR 22491--1808	224909.6	-180820	45.2	-61.0	23262	0.12	0.55	5.44	4.45	22.9	2.13	-0.66	0.09	072385	1200		
NGC 7469	230044.6	+08 36 18	83.1	-45.5	4902	1.35	5.79	25.87	34.90	149.7	1.56	-0.63	-0.13	072485	100		
Zw 453.062	230228.1	+ 19 1655	91.2	-36.7	7556	0.20	0.53	7.53	10.60	35.5	1.32	-0.42	-0.15	070492	600		
Zw 475.056	23 ]3 31.2	+25 ]6 48	97.3	-32.5	8155	0.26	1.80	9.76	11.13	49.1	1.53	-0.84	-0.06	072385	400		
NGC 7591	23 ]5 43.9	+06 18 47	85.8	-49.4	4968	0.32	0.75	7.22	12.86	39.7	1.00	-0.37	-0.25	070492	400		
NGC 7592\`	231547.5	-04 41 20	74.5	-58.2	7382	0.28	0.90	7.80	10.25	38.8	1.34	-0.50	-0.12	072485	400		
NGC 7592E	231547.5	-044120	74.5	-58.2	7318	0.28	0.90	7.80	10.25	38.8	11.34	-0.50	-0.12	072485	400		
NGC 7674	232524.7	+08 3014	90.6	-48.8	8746	0.67	1.90	5.59	8.15	41.4	11.51	-0.45	-0.16	072485	300		
NGC 7679	23 26 ]3.9	+03 1413	86.7	-53.4	4806	0.50	1.10	7.28	10.65	44.8	10.99	-0.34	-0.17	070492	100		
NGC 7714	233339.8	+01 5234	88.2	-55.6	2805	0.47	2.85	10.36	11.51	59.2	10.67	-0.79	-0.05	072485	100		
IR 23365+3604	233631.5	+36 0426	107.0	-24.3	19364	0.10	0.81	7.09	8.36	32.1	12.11	-0.93	-0.07	121685	900		
NGC 7771Main	234852.1	+19 4955	104.3	-40.6	4363	0.73	1.76	18.99	38.43	106.3	11.28	-0.38	-0.31	07 04 92	250		
NGC 7771S	234852.1	+19 4955	104.3	-40.6	3993	0.73	1.76	18.99	38.43	106.3	11.28	-0.38	-0.31	07 04 92	250		
Mrk 331	234852.8	+20 18 22	104.5	-40.	5486	0.50	2.50	18.60	21.63	89.2	11.44	-0.70	-0.07	072485	200		

\*: wrong velocity entry in NED (3447 km/s)

**Table 1 b. Infrared Properties of Warm IRAS Galaxies**

Name (1)	RA(1950) (2)	Dec(1950) (3)	$\ell$ (4)	b (5)	cz (6)	F(12) (7)	F(25) (8)	F(60) (9)	F(100) (10)	F.Q. (11)	F(ir) (12)	L(ir) (13)	12/25 (14)	60/100 (15)	obs (16)	date (17)
<b>NGC 985</b>	023209.4	-090024	180.8	-59.5	5916*	0.21	0.52	1.38	1.89	3332	11.0	10.59	-0.40	-0.14	072685	300
<b>IR 02433+1544</b>	024323.6	+15 44 32	159.2	-38.7	7684	0.13	0.54	3.09	3.67	2332	16.2	10.99-0.62	-0.07	012587	600	
<b>MCG+0310045</b>	034420.8	-164214	207.6	-48.2	1110	0.19	0.62	4.77	7.88	3332	25.9	9.51	-0.51	-0.22	121485	300
<b>IR 042590440</b>	042557.5	-044024	199.4	-33.7	4763	0.16	1.40	4.13	3.303322	23.3	10.73	-0.95	0.10012587	600		
<b>IR 07599+6508</b>	075955.6	+65 08 18151.2	32.1	44362	0.26	0.53	1.69	1.73	3332	12.4	12.45	-0.31	-0.01	01 2587	600	
<b>IR 09209+3943</b>	092054.8	+39 43 27	183.0	45.627669	0.09	0.16	0.66	1.40	1131	5.1	11.63	-0.27	-0.33	121485	900	
<b>IR 09218+3428</b>	09 21 51.9	+342838	190.5	45.520310	0.09	0.14	0.42	0.50	1132	3.6	11.20-0.17	-0.08	121485	900		
<b>IR 09245+3517</b>	09 24 31.6	+35 17 28	189.1	46.1	41694	0.07	0.12	0.49	1.04	1132	3.8	11.88	-0.25	-0.33	121585	900
<b>IR 09245+3300</b>	09 2434.1	+33 0017	192.7	45.966420	0.07	0.07	0.42	0.48	1132	2.9	12.20	0.03	-0.06	121685	900	
<b>IR 09252+3124</b>	092517.6	+31 2406	195.0	45.8	23914	0.09	0.08	0.43	0.951132	3.7	11.36	0.03	-0.34	121485	600	
<b>IR 09268+2808</b>	092653.1	+28 0849	199.7	45.6	13088	0.12	0.13	0.58	0.70	1132	4.5	10.91	-0.05	-0.08	121485	900
<b>Zw 238.066</b>	092745.7	+49 1801	169.2	45.9	10207	0.14	0.45	1.66	2.30	2332	10.8	11.07	-0.51	-0.14031987	1200	
<b>IR 09303+2736</b>	033021.9	+27 3620	200.7	46.3	12718	0.08	0.11	0.35	0.79	1132	3.3	10.75	-0.17	-0.35	121685	1200
<b>IR 09338+3133</b>	033351.9	+31 3314	195.2	47.722946	0.12	0.17	0.78	1.56	1232	6.1	11.54	-0.14	-0.30	12 1685	900	
<b>IR 09339+2835</b>	033359.7	+28 3553	199.5	47.235769	0.07	0.11	0.46	0.76	1132	3.5	11.70-0.17	-0.22	121485	900		
<b>IR 09399+2830</b>	093956.1	+28 3053	200.0	48.5	15962	0.09	0.22	0.66	0.71	1132	4.7	11.10-0.40	-0.04	121685	900	
<b>Zw 182.010</b>	094215.5	+34 5635	190.3	49.7	12324	0.12	0.33	1.98	3.36	2332	11.7	11.27	-0.45	-0.23	031987	1200
<b>IR 09425+1751</b>	094235.4	+17 5145	215.4	46.238423	0.13	0.44	0.89	0.57	1332	6.8	12.06	-0.54	0.19	121685	900	
<b>IR 09427+1929</b>	094242.5	+19 2936	213.2	46.844736	0.10	0.15	0.49	0.99	2132	4.3	12.00-0.18	-0.31	121685	900		
<b>IR 09433+1910</b>	09 4318.7	+19 1028	213.7	46.8	15947	0.10	0.21	3.67	4.59	1232	16.5	11.65	-0.33	-0.10	121685	600
<b>IR 10210+7528</b>	1021 03.9	+75 2846	134.1	38.6	8175	0.09	0.48	2.48	2.81	1332	13.0	10.95	-0.71	-0.05	01 2587	600
<b>IR 11571+3004</b>	115707.2	+30 0404	196.7	78.3	15163	0.11	0.14	0.92	1.77	1132	6.3	11.18	-0.08	-0.29	052886	200
<b>IR 12071-0444</b>	1207 11.4	-044432	284.0	56.3	38513	0.12	0.54	2.46	2.47	1332	13.2	12.35	-0.65	0.00012587	600	
<b>Zw 041.073</b>	12 1533.8	+06 2507	280.8	67.6	5531	0.19	0.69	2.72	3.33	2132	16.4	10.71	-0.56	-0.09	01 2587	300
<b>IR 12450+3401</b>	124502.6	+34 0134	130.1	83.347621	0.11	0.14	0.92	1.77	1132	6.3	12.22	-0.08	-0.29	052886	1200	
<b>IR 13349+2438</b>	133456.7	+24 3823	20.6	79.3	32270	0.63	0.84	0.61	0.99	3331	15.4	12.25	-0.12	-0.21	121685	300
<b>Zw 102.056</b>	134423.8	+14 3901	351.1	71.9	6404	0.20	0.75	3.46	5.42	3332	20.9	10.94	-0.57	-0.19	01 25 87	300
<b>IR 13446+1121</b>	134436.0	+11 2122	344.8	69.3	6912	0.17	0.84	3.28	3.73	2332	18.8	10.96	-0.70	-0.0601	2587	300
<b>IR 14229+1425</b>	142256.2	+14 2513	7.1	64.6	17974	0.09	0.36	1.60	2.22	1332	9.5	11.51	-0.59	-0.14031987	1200	
<b>IR14341+3017NW</b>	143407.4	+30 17 15	46.5	66.9	10313	0.08	0.07	0.24	0.54	1132	2.7	10.48	0.07	-0.35	03 1987	500
<b>IR14341+3017SE</b>	143407.4	+30 1715	46.5	66.9	10369	0.08	0.07	0.24	0.54	1132	2.7	10.48	0.07	-0.35	031987	500
<b>IR 14416+6618</b>	144139.0	+66 1854	106.7	47.4	11300	0.10	0.56	2.19	1.80	2332	11.7	11.19	-0.75	0.09	0319 87	900
<b>IR 15206+3342</b>	152038.5	+33 4215	53.4	56.9	37539	0.08	0.35	1.77	1.89	2332	9.3	12.17	-0.63	-0.03	031987	900
<b>IR 15304+3017</b>	153027.4	+30 17 51	47.6	54.7	19483	0.08	0.21	0.35	0.59	2331	3.7	11.18	-0.40	-0.22	072485	600
<b>IR 15312+4236</b>	15 31 14.0	+42 3623	68.7	53.9	5988	0.05	0.06	0.40	0.92	1232	3.0	10.04	-0.10	-0.36072685	300	
<b>IR 15324 +3203</b>	153229.0	+32 0307	50.6	54.4	32772	0.06	0.09	0.42	0.74	1132	3.1	11.57	-0.15	-0.24	07:485	1200
<b>IR 15358 +3831</b>	153548.9	+38 31 08	61.6	53.6	15313	0.07	0.06	0.39	0.92	1132	3.1	10.88	0.07	-0.38	072685	300
<b>IR 15359+3139</b>	153558.2	+31 3939	50.0	53.6	16061	0.06	0.10	0.48	0.76	1132	3.3	10.95	-0.26	-0.20	072485	900
<b>IR 15364+3320</b>	153624.1	+33 2043	52.9	53.7	6743	0.06	0.08	0.50	0.98	1232	3.5	10.21	-0.12	-0.29	07 24 85	600

**Table Ib. Infrared Properties of Warm IRAS Galaxies**

Name	RA(1950)	Dec(1950)	$\ell$	b	cz	F(12)	F(25)	F(60)	F(100)	F.Q.	F(ir)	L(ir)	12/25	60/100	obs	date	int
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
IR 15384+3841	153826.3	+3841 54	61.8	53.1	20204	0.08	0.08	0.37	0.91	1132	3.4	11.17	-0.02	-0.39	072685	600	
IR 15391 +3214 SW'	15 39 06.1	+321425	51.1	53.0	15981	0.09	0.20	1.23	2.38	1332	7.8	11.32	-0.36	-0.29	072385	900	
IR 15391 +3214NE	153906.1	+321425	51.1	53.0	15775	0.09	0.20	1.23	2.38	1332	7.8	11.32	-0.36	-0.29	072385	900	
IR 15394+3532	153929.2	+35 32 20	56.6	53.0	37208	0.07	0.05	0.47	0.95	1132	3.4	11.73	0.20	-0.30072485	1200		
IR 15404+3228	154027.3	+32 28 31	51.5	52.8	20794	0.05	0.12	0.88	0.97	1232	4.5	11.32	-0.38	-0.04	072385	1500	
IR 15414+3238	154128.7	+323821	51.8	52.6	60926	0.05	0.06	0.28	0.55	1132	2.3	12.02	-0.07	-0.29	072485	1800	
IR 15418+3938	154148.9	+393856	63.3	52.4	19423	0.06	0.09	0.48	0.89	1132	3.4	11.14	-0.17	-0.27	072685	900	
IR 15418+2840	154153.4	+28 40 51	45.4	52.0	9888	0.07	0.34	1.22	1.32	1332	7.2	10.86	-0.66	-0.03	072385	600	
IR 15440+2834	154404.8	+283407	45.3	51.5	9867	0.07	0.08	0.44	1.15	1132	3.6	10.56	-0.03	-0.41	072485'	900	
IR 15445+3312	154432.1	+33 12 57	52.8	51.9	46713	0.05	0.06	0.38	0.86	1132	2.8	11.85	-0.06	-0.35	072585	1200	
IR 15463+4131	154619.7	+41 31 38	66.2	51.3	9954	0.05	0.10	0.46	1.43	1131	3.8	10.59	-0.30	-0.50072685	900		
IR 15469+2853	154655.5	+28 53 30	46.0	51.0	9798	0.07	0.12	0.61	1.37	1232	4.5	10.65	-0.20	-0.35	072585	300	
IR 15481+2920	154806.6	+29 20 13	46.7	50.8	25000	0.08	0.12	0.53	1.23	1232	4.2	11.46	-0.	18	-0.36	072585	600
IR 15483+4227	154822.3	+42 27 31	67.6	50.8	6304	0.06	0.04	0.35	0.86	1131	2.8	10.06	0.14	-0.40	072685	900	
IR 15514+3330	155128.8	+33 30 00	53.4	50.5	16525	0.07	0.10	0.51	0.96	1132	3.7	11.03	-0.18	-0.28	072585	600	
IR 15519+3537	155154.9	+35 37 02	56.7	50.5	25567	0.09	0.09	0.78	1.91	1232	5.6	11.60	-0.01	-0.39	072385	1200	
IR 15534+3004	155325.1	+30 04 31	48.1	49.8	21105	0.06	0.07	0.40	0.83	1132	3.1	11.17	-0.07	-0.32	072585	1200	
IR 15534+3519	155329.0	+35 19 37	56.3	50.2	25682	0.06	0.09	0.37	0.95	1132	3.2	11.36	-0.17	-0.41	072685	600	
IR 15535+2854	155334.2	+285402	46.4	49.5	23354	0.05	0.08	0.41	0.90	1232	3.1	11.26	-0.19	-0.34	072585	600	
IR 15543+4158NW	IS 5421.6	+41 58 07	66.6	49.8	40294	0.08	0.10	0.41	0.66	1132	3.2	11.78	-0.10	-0.21	072685	900	
IR 15543+4158SE	155421.6	+41 58 07	66.6	49.8	40437	0.08	0.10	0.41	0.66	1132	3.2	11.78	-0.10	-0.21	072685	900	
IR 15543+3013	155421.7	+30 13 16	48.4	49.6	36364	0.04	0.10	0.39	0.68	1132	2.8	11.62	-0.37	-0.24	072585	600	
IR 15545+4000	155430.9	+400012	63.6	49.9	21347	0.10	0.16	0.79	0.94	1332	5.1	11.40	-0.21	-0.07	072685	600	
IR 15549+4201	155454.1	+4201 35	66.7	49.7	10489	0.12	0.21	1.90	3.28	3332	11.0	11.10	-0.24	-0.24	072685	300	
IR 15569+2807W	155655.8	+28 07 42	45.4	48.7	15693	0.07	0.09	0.68	1.41	1232	4.6	11.08	-0.10	-0.32	072385	1800	
IR 15569+2807E	155655.8	+28 07 42	45.4	48.7	15506	0.07	0.09	0.68	1.41	1232	4.6	11.08	-0.10	-0.32	072385	1800	
IR 15577+3816	15 57 42.5	+38 16 58	60.9	49.4	65661	0.06	0.08	0.45	0.56	1132	3.0	12.20	-0.12	-0.10	072685	1200	
IR 15589+4121	155856.7	+4121 50	65.6	49.0	28661	0.06	0.07	0.47	0.66	1132	3.0	11.43	-0.07	-0.15	072685	1200	
IR 15597+3133	155944.8	+31 33 35	50.7	48.6	43070	0.06	0.10	0.47	1.11	1132	3.7	11.90	-0.18	-0.38	072585	1800	
IR 16007+3743	160045.0	+37 43 06	60.0	48.8	55412	0.08	0.06	0.32	0.53	1132	2.7	12.00	0.14	-0.22	072585	1200	
IR 16130+2725	161301.1	+27 25 59	45.4	45.1	12977	0.04	0.09	0.22	0.76	1131	2.3	10.61	-0.34	-0.54	052986	600	
Zw 052.015	162333.5	+03 01 09	17.3	33.4	1426	0.17	0.62	3.19	4.11	3332	17.8	9.56	-0.57	-0.11	031987	6b0	
IR 21479-1305	2147 58.3	-1305 37	42.4	-45.5	30627	0.07	0.24	1.32	2.32	1132	8.0	11.92	-0.51	-0.24	072585	1200	
IR 214 S3-1314	21 4826.5	-13 14 05	42.3	-45.6	23038	0.14	0.14	0.59	1.36	1132	5.5	11.50	0.02	--0.36	072685	600	
IR 21549-1206NW	21 5454.3	-120607	44.8	-46.5	15102	0.11	0.21	0.81	1.55	1132	6.2	11.18	-0.28	-0.28	072685	600	
IR 21549 -1206S1:	215454.3	-120607	44.8	-46.5	15267	0.11	0.21	0.81	1.55	1132	6.2	11.18	-0.28	-0.28	072685	600	
IR 22114-1109	22 1127.2	-110917	48.9	-49.7	16358	0.10	0.32	0.66	1.05	1131	5.7	11.21	-0.51	-0.20	072685	600	
IR 22152-0227	221516.3	.02 27	23	60.4	-45.6	27880	0.12	0.22	0.97	1.36	1232	6.7	11.76	-0.24	-0.14	072785	900
IR 22191-1400	22 19 11.9	-14 00 11	46.3	-52.7	23234	0.16	0.26	0.64	1.07	1132	6.2	11.56	-0.22	-0.22	07 26 85	1200	
IR 22193-1217	22 1921.0	-121746	48.8	-51.9	23917	0.12	0.17	1.08	1.79	1132	7.1	11.64	-0.16	-0.22	07 25 85	600	

**Table 1 b. Infrared Properties of Warm IRAS Galaxies**

Name (1)	RA(1950) (2)	Dec(1950) (3)	$\ell$ (4)	b (5)	cz (6)	F(1.2) (7)	F(25) (8)	F(60) (9)	F(100) (10)	F.Q. (11)	F(ir) (12)	L(ir) (13)	12/25 (14)	60/100 (15)	obs (16)	date (17)
<b>IR 22199-0345</b>	221957.5	-034506	60.0	-47.3	18111	0.15	0.37	<b>1.35</b>	1.80	1131	9.2	11.51	-0.39	-0.13	072585	600
<b>IR 22204-0214~</b>	2204.4	-021428	61.8	-46.5	41808	<b>0.11</b>	0.20	0.65	2.09	1131	<b>6.3</b>	12.10	-0.25	-0.51	072785	1200
<b>IR 22204-0214SE</b>	222024.4	-021428	61.8	-46.5	41836	0.11	0.20	0.65	2.09	1131	6.3	12.10	-0.25	-0.51	072785	1200
<b>IR 22213-4238</b>	2221 19.3	-023854	61.6	-46.9	16906	0.18	0.22	0.79	1.25	1132	6.9	11.32	-0.10	-0.20	072785	200
<b>IR 222200825</b>	222201.1	-082516	54.6	-50.5	18062	0.09	0.33	<b>1.05</b>	1.49	1132	7.1	11.39	-0.58	--0.15	072785	900
<b>IR 22225-0615</b>	222232.5	-064523	56.9	-49.6	26765	0.12	0.22	0.79	1.61	1132	6.4	11.70	-0.26	<b>-0.31</b>	072785	900
<b>IR 22279 --1 112NW</b>	222755.6	-11 1254	52.1	-53.2	26048	0.12	0.25	0.77	0.98	1132	5.8	<b>11.64</b>	-0.33	-0.100	072785	450
<b>IR 22279--1 112SE</b>	222755.6	-11 1254	52.1	-53.2	26276	0.12	0.25	0.77	0.98	1132	5.8	11.64	-0.33	-0.100	072785	900
<b>IR 22283--1439</b>	222819.3	-143954	47.0	-54.9	18579	0.13	0.19	0.77	1.32	1132	6.1	11.35	-0.16	-0.23	072785	600
<b>IR 22338-1015</b>	223353.3	-101540	54.7	-53.9	18510	0.13	0.25	0.80	1.12	1132	6.3	11.36	-0.28	-0.14	072785	450
<b>IR 22343-0840</b>	223419.3	-084051	57.1	-53.1	24805	0.14	0.23	0.79	0.96	1132	6.0	11.60	-0.22	<b>-0.08</b>	072785	600
<b>IR 22381-1337</b>	223807.9	-133723	50.7	-56.5	32968	0.15	0.34	0.90	1.15	1132	7.2	11.94	-0.36	-0.11	072785	450
<b>IR 22472+3439</b>	224712.5	+34 3916	96.4	-21.6	7122	0.21	0.39	4.98	9.90	3332	27.5	11.16	-0.27	-0.30	121685	900

\* Wrong velocity entry in NED (12960 km/s). There is an apparent NaI D line at 6008 Å - 5916 km/s. Misidentification of [SII] as H $\alpha$ .

**Table 2a. Observed Emission-Line Fluxes - IRAS Bright Galaxies**

Name	[OII] 3727	H <sub>β</sub> splot	H <sub>β</sub> specfit	[OIII] 4959 adopt	[OIII] 5007	[OI] 6300	[NII] 6548	H <sub>α</sub> [NII]	[SII] 6563 6583	[SII] 6716	[SII] 6731 Other Lines		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
* NGC 23	—	0.17	0.17	0.17	0.027	0.07	0.036	0.20	1.00	0.59	0.17	0.16	
* NGC 34	--	0.039	0.042	0.040	0.043	0.16	0.092	0.43	1.00	1.29	0.35	<b>0.19nB</b>	[1]
*MCG-0201051S	---	—	—	0.14	0.032	0.10	0.029	0.15	1.00	0.44	0.14	0.13	
*MCG-0201051N	--	—	—	0.23	--	0.061:	<b>0.018u</b>	0.12	1.00	0.37	0.1	<b>1nB</b>	0.08
*NGC 232	—	0.094	0.096	0.095	0.044	0.17	0.042	0.25	1.00	0.74	<b>0.21:s</b>	—	
*UGC 556	—	0.10	0.11	0.10	--	0.074	0.13	0.20	1.00	0.60	0.29	<b>0.24nB</b>	
*IC 1623N	—	0.25	0.26	0.25	0.12	0.34	0.036	0.091	1.00	0.27	0.21	<b>0.06:nB</b>	
*IC 1623SE	0.03e	--	—	0.29	0.22	0.67	0.027	0.072	<b>1.00</b>	0.22	0.14	<b>0.10nB</b>	[2]
* MCG-0304014	--	0.12	0.11	0.12	0.022	0.050	0.022	0.17	1.00	0.52	0.13	0.11	
*MCG+0204025	0.20	0.10	0.13	0.12	0.037	0.11	0.039	0.14	<b>1.00</b>	0.39	0.17	0.14	
● UCK 903	—	0.10	<b>0.11</b>	0.11	--	0.092	0.040u:	0.15	1.00	0.46	0.21	0.17	
*NGC 520	—	--	<b>0.031u</b>	—	--	--	0.054u	0.23	1.00	0.70	0.32	0.24	
*IR 01364-1042	—	0.064:	<b>0.12:</b>	0.091 u	0.097	0.17	0.30	0.33	<b>1.00c:</b>	0.98	0.38	0.26	
*NGC 660	—	--	..	0.060	0.13	0.16	0.062	0.34	1.00	1.02	0.25	0.23	
*111 Zw 35S	—	0.046:	0.15	<b>0.10;u</b>	—	0.13	0.18	0.34	1.00	1.04	0.27	0.27	
* III Zw 35N	—	—	—	0.26	0.16	0.50	0.045	0.064	1.00	0.19	0.19	0.12	[3]
*NGC 695	—	0.11	0.14	0.13	--	0.039	0.052	0.15	<b>1.00</b>	“0.45	0.10	0.07	
* NGC 873	—	0.11	0.12	0.11	0.021	0.061	0.018	0.16	<b>1.00</b>	0.47	0.14	0.10	
NGC 1050	—	0.16	0.16	0.16	0.022	0.055	0.023	0.19	1.00	0.58	0.13	0.12	
NGC 1056	—	0.15	0.15	0.15	0.035	0.12	0.041	0.13	1.00	0.39	0.21	0.16	
*NGC 1068	--	—	—	0.16	0.81	2.52	0.12	0.90:	1.00:	1.28:	0.34s	--	[4]
● hTC* 1083	4.23e	0.17	0.21	0.18	0.066	0.10	0.052	0.13	1.00	0.40	0.22	0.16	
* UGC 2238	—	—	—	<b>0.034u:</b>	--	0.069	0.082	0.21	1.00	0.64	<b>0.37:sc</b>	--	
* I R 02438+2122	—	0.047U	0.031	u	0.039U	--	<b>0.13u</b>	<b>0.16u</b>	0.45	1.00	1.36	<b>0.34:sc</b>	--
*UGC 2369	—	--	—	0.15	0.021	0.065	0.020	0.18	<b>1.00</b>	0.53	0.14	0.088	
NGC 1143/44	--	0.17	0.24	0.20	1.05	2.73	0.19	0.73	1.00	2.18	1.14s	--	[5]
* UGC 2403	—	—	—	0.066	--	0.036	0.039	0.18	1.00	0.54	0.15	0.13	[6]
NGC 1204	--	0.046	0.068	0.057	--	0.024	0.064	0.26	1.00	0.79	0.18	<b>0.22nB</b>	
NGC 1266	—	<b>0.17u</b>	0.18	0.17u:	<b>0.097u</b>	0.22	0.32	1.24	<b>1.00</b>	3.74	0.85	0.87	
NGC 1377	—	—	—	—	—	—	—	—	<b>1.04u</b>	<b>1.00u</b>	3.89	1.30	0.74
IR 03?59-1523	<b>0.17e</b>	—	—	0.18	0.069	0.21	0.018	0.12	1.00	0.35	0.10	0.094	7]
UGC 2982	—	0.047	0.067	0.054	--	<b>0.015u</b>	0.019	0.14	1.00	0.43	0.20	<b>0.15cB</b>	
ESO 550-IG025S	—	0.076	0.19	0.11	--	0.037	0.069	0.26	1.00	0.78	0.23	0.15	
ESO 550-IG025N	--	0.091	0.13	0.11	--	0.074	<b>0.091</b>	0.21	1.00	0.64	0.23	0.17	
NGC 1614	—	--	0.13	0.033	0.099	0.017	0.20	1.00	0.60	0.10	0.10	8]	
IR 04335-2514	—	<b>0.025u</b>	0.043	0.034U:	--	—	0.097	0.36	1.00	1.09	0.31	<b>0.41nB</b>	
ESO 485-G003	--	0.17	0.18	0.17	0.018	0.054	0.020	0.12	1.00	0.35	0.16	<b>0.13nB</b>	
IC 398	—	—	—	—	—	0.042u	<b>0.056u</b>	0.33	1.00	1.01	0.30	0.18	
NGC 1797	—	0.11	0.12	0.11	0.009	0.018	0.024	0.18	1.00	0.54	0.13	0.13	
IR 051.S6-1017	—	—	—	<b>0.042u</b>	—	0.062u	0.12	0.40	1.00	1.27	<b>0.68sc</b>	—	
IR 05189-2524	--	0.029	0.071	0.043:	0.64	1.82	0.060	0.37	1.00	<b>1.10</b>	0.16	0.062	[9]
NGC 2388	—	0.09	0.09	0.09	--	0.014	0.022	0.19	1.00	0.58	0.13	0.13	
IR 08339-6517	<b>0.59:e</b>	0.23	0.23	0.23	0.14	0.41	0.014	0.09	1.00	0.26	0.14	<b>0.11cB</b>	[10]
NGC 2623	--	—	—	—	0.088	—	0.10	0.33	1.00	0.98	<b>0.61sc</b>	--	
IR 08572-3915	—	—	—	0.11	0.11	0.25	0.046	0.14	1.00	0.42	0.27	0.18	
NGC 2785	—	—	0	0	6	8	0.049	0.20	1.00	0.60	0.21	0.18	
UGC 4881SW	--	0.070	0.093	0.079	—	0.044	0.046	0.21	1.00	0.65	0.18	0.15	
UGC 4881NE	—	0.089	0.13	0.11	<b>0.019u</b>	0.034:	0.050	0.24	1.00	0.72	0.17	0.13	
UGC 5101	<b>0.20e</b>	0.035	0.050	0.042	0.061	0.12	0.089	0.45	1.00	1.34	0.29	0.12	
MCG-0818012	--	0.089	0.15	0.11	0.029	0.074	0.044	0.20	1.00	0.60	<b>0.15nB</b>	0.13nB	

**Table 2a, Observed Emission-Line Fluxes - IRAS Bright Galaxies**

Name	[OII] 3727	H <sub>β</sub> splot specfit	[OIII] 4959	[OIII] 5007	[OI] 6300	[NII] H <sub>α</sub> 6548	[NII] 6563	[SII] 6716	[SII] 6731	other Lines			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
NGC 3110	—	0.14	0.15	0.15	—	0.018	0.024u	0.14	1.00	0.41	0.11	0.12	
* I R 10565+2448 Main	--	--	—	0.062	--	0.038	0.034	0.16	1.00	0.49	0.17	0.12	
*IR 10565+2448E	—	—	—	—	—	—	—	0.23	1.00	0.68	1.24s	---	
NGC 3508S	—	0.21	0.24	0.22	0.028	0.087	0.002u:	0.12	1.00	0.35	0.16	0.11	
NGC 3508N	--	0.10	0.13	0.11	—	0.028	0.019u	0.12	1.00	0.35	0.15	0.095	
NGC 3597	—	—	—	0.18	—	0.13	0.025u	0.14	1.00	0.43	0.17	0.13	
MCG+0029023	--	0.069	0.11	0.082	0.050	0.11	0.046	0.24	1.00	0.66	0.31sc	—	
* UGC 6436NW	—	—	—	0.055	—	0.020	0.023	0.16	1.00	0.49	0.11	0.093	
*UGC 6436SE	—	—	—	0.046	—	—	0.022U	0.21	1.00	0.59	0.12	0.11	
*IR 12224-0624	—	—	—	0.24;	—	0.18:	0.85	0.37	1.00	1.11	0.23s	—	
*NGC 4666	—	—	—	0.13	—	0.17	0.055;	0.41	1.00	1.30	0.35	0.29	
IC 390s	—	—	—	0.13	0.039u	0.064	0.051u	0.11	1.00	0.33	0.19	0.13	
UGC 8058	—	—	—	—	—	—	—	—	—	—	—	S1	
*NGC 4922	—	—	—	0.14	0.12	0.42	0.071	0.24	1.00	0.73	0.17	0.16cB [11]	
MCG-0233098W	—	—	—	0.082	0.019	0.061	0.065	0.11	1.00	0.32	0.17	0.071 [12]	
MCG-0233098E	—	0.16	0.14	0.16	—	0.11	0.054u	0.087	1.00	0.26	0.30s	—	
*IC 860	—	—	—	—	—	0.70	1.06	1.48	1.00	7.82	4.16s	—	
*UGC 8335NW	—	—	—	0.13	0.099	0.18	0.053	0.15	1.00	0.46	0.22	0.15	
*UGC 8335SE	0.16	--	—	0.15	0.053	0.17	0.032	0.14	1.00	0.41	0.11	0.11 [13]	
*UGC 8387	---	0.069	0.099	0.081	—	0.065	0.098	0.22	1.00	0.67	0.20	0.24cB	
*NGC 5104	—	—	—	0.045u	—	0.061	0.072	0.29	1.00	0.87	0.55cBs	—	
*NGC 5218	--	0.079	0.11	0.090	—	0.045	0.11	0.29	1.00	0.87	0.24	0.27	
*NGC 5256SW	0.44	—	—	0.26	0.13	0.37	0.12	0.21	1.00	0.63	0.25	0.23 [14]	
*NGC 5256NE	0.17:t	—	—	0.16	0.24	0.70	0.052	0.19	1.00	0.56	0.21	0.18 [15]	
*NGC 5257	—	—	-	0.31	0.078	0.24	0.021	0.12	1.00	0.35	0.15	0.12cA	
*NGC 5258	—	—	—	—	—	—	—	0.18	1.00	0.57	—	—	
*UGC 8696	—	—	—	0.11	0.13	0.35	0.13	0.35	1.00	1.04	0.62s	—	
*NGC 5430	--	0.11	0.15	0.12	—	0.043	0.029	0.17	1.00	0.50	0.16	0.12	
*Z_w 247.020	—	—	—	0.084	—	0.034	0.026	0.25	1.00	0.76	0.11	0.12	
● hLGc 5653W	—	—	0.18	0.017	0.041	0.012	0.13	1.00	0.38	0.13	0.10	[16]	
*NGC 5653E	-	0.084	0.14	0.11	—	0.024u;	0.018u	0.12	1.00	0.37	0.12	0.076	
*NGC 5676	--	0.14u	0.16	0.015u	—	0.072u:	—	0.18	1.00	0.55	0.23:s	—	
*IR 14348-1447SW	—	—	—	0.078	0.034	0.12	0.082	0.20	1.00	0.60	0.23	0.14	
*IR 14348-1447NE	—	—	—	0.12	—	0.16	0.13	0.21	1.00	0.63	0.33	—	
*NGC 5734	0.10	0.12	0.10	—	—	—	0.21	1.00	0.63	0.29s	—		
*UGC 9518	—	—	—	0.14	0.085	0.13	0.072	0.27	1.00	0.82	0.22	0.15nB	
Z_w 049.057	..	—	—	0.023u	—	0.005u:	0.028u:	0.10	1.00	0.29	0.31s	—	
*I Zw107S	—	—	—	0.056	—	0.078	0.070	0.26	1.00	0.78	0.30	0.21	
*I Zw107N	—	—	—	0.12	0.039	0.13	0.034	0.19	1.00	0.56	0.15	0.13	
*IR 15250+3609	—	—	—	0.15	0.070	0.21	0.069	0.16	1.00	0.47	0.22	0.15	
* NGC 5936	--	--	—	0.079	—	0.022	0.024	0.20	1.00	“0.6”1	0.13	0.12	
*NGC 5953	--	0.13	0.11	—	0.27	0.058	0.26	1.00	0.78	0.23	0.19		
UGC 9913W	—	—	—	—	0.12	0.20	0.64	1.00	1.93	0.56	0.36		
UGC 9913E	—	—	—	—	0.038	0.12	0.17	0.57	1.00	1.70	0.57	0.29	
*IR 15335-0513	—	—	—	0.057u	—	0.038u	0.17	0.40	1.00	1.20	0.51	cBs	
*NGC 6090SW	—	0.22	0.074	—	0.27	0.018	0.11	1.00	0.35	0.13	0.10		
*NGC 6090N:	—	—	—	0.20	0.024	0.093	0.017	0.11	1.00	0.33	0.089	0.079	
*IR 16164-0716	—	—	—	0.060:	—	0.074	0.20	0.34	1.00	1.03	0.49cBs		
*MCG+01-2088	0.077	0.089	0.081	—	0.026	0.034	0.18	1.00	0.53	0.17cB	0.17cB		
*NGC 6181	0.14	0.17	0.16	—	0.033u	—	0.16	1.00	0.47	0.13	0.12		

**Table 2a. Observed Emission-Line Fluxes - IRAS Bright Galaxies**

Name.	[OII]			$H_{\beta}$		[OIII]			[OI] [NII] $H_{\alpha}$		[NII]	[SII]	[SII]	Other
	3727	splot	specfit	adopt	4959	5007	6300	6548	6563	6583	6716	6731	Lines	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
*NGC 6240	..	—	—	0.062	0.026	0.087	0.31	0.42	1.00	1.27	1.24s	—	—	
*NGC 6285/6NW	—	—	—	0.14	—	0.071	0.052	0.16	1.00	0.48	0.54s	—	—	
*NGC 6285/6SE	—	—	—	0.092	—	0.059	0.13	0.28	1.00	0.84	<b>0.66cBs</b>	—	—	
*IR 17132 +5313W	—	—	—	—	—	—	—	0.99	1.00	2.97	0.35	0.25	—	
*IR 17132 +5313E	—	—	—	0.20	0.031	0.089	0.022	0.15	1.00	0.45	0.17	0.16	—	
*IR 17138-1017	—	—	—	—	—	0.055	0.037:	0.17	1.00	0.50	0.21	0.15	—	
*IR 17208-0014	—	—	—	0.054	—	0.048	0.041	0.16	1.00	<b>0.40cB</b>	0.15	0.11	—	
● NGC 6621	—	0.080	0.11	0.088	—	0.038	0.045	0.20	1.00	0.61	<b>2.73cB</b>	—	—	
*IR 18293 -2413	—	—	—	0.061	—	0.018	0.028	0.15	1.00	0.46	<b>0.15</b>	0.12	—	
*NGC 6670W	—	—	—	0.056	—	<b>0.008:u</b>	0.022	0.13	1.00	0.38	0.14	<b>0.10</b>	—	
*NGC 6670E	—	—	—	0.051	—	0.046	0.034	<b>0.13</b>	1.00	0.38	0.16	0.14	—	
*NGC 6701	—	—	—	0.10	—	0.086	0.051	0.25	1.00	0.75	0.18	0.17	—	
*ESO 593-IG008S	—	—	—	0.34	—	0.22	0.099	0.93	1.00	2.79:	0.59s	—	—	
*ESO 593-IG008N	—	—	—	0.11	—	0.078	0.032	0.16	1.00	0.49	0.20	0.13	—	
*IR 19297-0406	—	—	—	0.073	—	0.051	0.065	0.19	1.00	0.56	0.19	0.15	—	
*NGC 6926	—	—	—	<b>0.064:u</b>	—	0.48	0.33	0.46	1.00	1.32	<b>0.78cB</b>	—	—	
*Zw 448 .020Main	---	—	—	0.26	0.19	0.53	0.021	0.072	1.00	0.22	0.094	0.077	[17]	
*Zw 448 .020NW	—	—	—	0.14	—	—	0.083	0.20	1.00	0.59	0.20	0.14	—	
*ESO 286-IGO19	—	—	—	0.11	—	0.098	0.061	0.13	1.00	0.39	0.24	0.15	—	
*ESO 343-IG013S	—	—	—	0.20	—	0.083	0.053	0.18	1.00	0.54	0.24	<b>0.17cB</b>	—	
*ESO 343-IG013N	—	—	—	0.12	—	0.059	0.043	0.17	1.00	0.51	0.24	0.1	6cB	
*IC 5135	—	—	—	—	—	0.012	0.008	0.039:	1.00:	0.035:	0.012	<b>0.008cB</b>	—	
*IC 5179	—	—	—	0.11	—	<b>0.025u</b>	0.037	0.10	1.00	0.31	0.12	<b>0.11nB</b>	18]	
* ESO 602-G025	—	—	—	0.094	0.075	0.099	0.059	0.22	1.00	0.67	0.12	0.091	—	
*ESO 534-G009	—	—	—	<b>0.17u:</b>	—	<b>0.34u:</b>	0.38	0.68	1.00	2.00	0.63	0.50	[19]	
*UGC 12150	—	0.045	0.065	0.051	—	0.018	0.034	0.23	1.00	0.68	<b>0.33cB</b>	—	—	
*IR 22491-1\$308	0.21	—	—	0.16	0.039	0.11	0.053	0.14	1.00	0.43	0.15	0.10	20]	
*NGC 7469	—	—	—	0.35	0.054	0.18	0.009	0.061	1.00	0.18	0.024	0.022	S1	
*Zw 453.062	—	—	—	0.091	0.075	0.11	0.12	0.40	1.00	1.22	<b>0.29cB</b>	<b>0.23cB</b>	—	
*Zw 475.056	--	0.10	0.11	<b>0.11</b>	0.16	0.50	0.048	0.32	1.00	0.96	0.14	0.14	—	
*NGC 7591	—	0.073	0.10	0.081	—	0.10	0.090	<b>0.31</b>	1.00	0.97	0.25	<b>0.18</b>	—	
*NGC 7592W	—	0.16	0.17	0.16	0.18	0.56	0.10	0.24	1.00	0.72	0.21	0.20	—	
*NGC 7592E	—	0.23	0.25	0.23	0.069	0.18	0.024	0.11	1.00	0.32	0.14	0.10	—	
*NGC 7674	<b>0.17f</b>	—	—	0.26	<b>1.00</b>	3.01	0.11	0.26	1.00	0.78	0.13	0.15	21]	
*NGC 7679	--	0.056	0.058	0.057	0.13	0.27	0.059	0.19	1.00	0.59	0.17	0.13	—	
*NGC 7714	—	—	—	0.28	0.15	0.44	0.018	0.12	1.00	0.37	0.10	0.10	22]	
IR 23365+3604	0.181	0.11	0.16	0.13	-	0.074	0.067	0.22	1.00	0.67	0.26	0.19	—	
*NGC 7771Main	—	0.047	0.045	0.047	—	0.049	0.044	0.16	1.00	0.48	0.20	0.21	—	
*NGC 7771S	—	—	—	0.19	0.056	0.13	0.010;	0.12	1.00	0.36	0.15	0.11	—	
*Mrk 331	--	0.11	0.14	0.12	—	0.046	0.025	0.18	1.00	0.54	0.14	0.13	—	

**Table 2b. Observed Emission-Line Fluxes - Warm IRAS Galaxies**

Name (1)	[011] 3 7 2 7	H <sub><math>\beta</math></sub> splot specfit		[oIn] adopt	[oIII] 4959	[oIII] 5007	[01]	[NII] H <sub><math>\alpha</math></sub>	[NII] 6300	[SII] 6548	[SII] 6563	[SII] 6583	[SII] 6716	Other 6731 Lines (14)
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
*NGC 985	--	--	--				0.15 u	0.69	1.00	2.06	1.68:sa	--	[23]	
*IR 02433+1544	--	--	0.063	--	0.015	0.021:u	0.21	1.00	0.62	0.19s	--			
MCG+0310045	0.14	0.14	0.14	0.036	0.090	0.024	0.11	1.00	0.32	0.18	0.13			
*IR 04259-0440	0.042;	0.12;	0.12;	0.059	0.23	0.12	0.24	1.00	0.74	0.55snB	--			
IR 07599+6508			--			--	--	--	--	--	--	--	S1	
IR 09209+3943	0.17	--	--	0.15		0.048	0.030c	0.15	1.00	0.45	0.16	0.12		
IR 09218+3428	0.22	--	--	0.16	0.037	0.11	0.027	0.14	1.00	0.43	0.17	0.12		
IR 09245+3517	0.075	--	--	0.090		0.075	0.046:c	0.19	1.00	0.56	0.27sc	--		
IR 09245+3300	--	--					--	--	--	--	--	--	out	
IR 09252+3124	--	--	0.064	--	0.12	0.074	0.20	1.00	0.60	0.36sa	--	--		
IR 09268+2808		0.11	0.15	0.13	--	0.034	0.034	0.15	1.00	0.45	0.13	0.12		
Zw 2?8.066	0.17e	0.10	0.12	0.11	0.051	0.19	0.065	0.27	1.00	0.82	0.22	0.19		
IR 09303+2736	--	--	--	0.063u:	--	0.022u:	0.021u	0.14	1.00	0.43	0.23	0.16		
IR 09338+3133	0.23	0.17	0.19	0.18	0.012	0.031	0.025	0.14	1.00	0.42	0.14	0.10		
IR 09339+2835	0.17			0.14	0.018	0.071	0.038	0.15	1.00	0.44	0.16	0.12		
IR 09399+2830	0.36:			0.13	0.073	0.21	0.060	0.16	1.00	0.48	0.19	0.15		
Zw 182.010	0.091e	0.11	0.14	0.13	0.014	0.033	0.022	0.17	1.00	0.51	0.13	0.11		
IR 09425+1751	0.38	--	.	0.17f	0.59	2.08	0.093	0.19	1.00	0.57	0.25s	--	[24]	
IR 09427+1929	0.30	0.23:	0.23:f	0.068u	0.098u	0.027u	0.13	1.00	0.39	0.34sf	--	--		
IR 09433+1910	--	--	--	--	--	--	--	--	--	0.70:	0.42:			
*IR 10210+7528	0.23e	--	--	0.19	0.064	0.18	0.028	0.15	1.00	0.46	0.23s	--	[25]	
IR 11571+3004	--	--	--	0.075u	--	--	0.21	1.00	0.63	0.24s	--			
*IR 12071-0444	0.10	0.069	0.086	0.069	0.12	0.41	0.070	0.10	1.00	0.31	0.58sc	--		
*Zw 041.073	--	0.12	0.11	0.11	0.010	0.030	0.015	0.13	1.00	0.40	0.22snB	--		
IR 12450+3401	1.36	--	--	0.31:	0.16	0.37	0.39:	0.42;	1.00;	1.25;	0.52:	1.11:cA		
IR 13349+2438	--	--	--	--	--	--	--	--	--	--	--	--	S1	
*Zw 102.056	.	--	--	0.16	0.063	0.20	0.018	0.13	1.00	0.40	0.22scB	--		
*IR 13446+1121	.	--	--	0.071	0.10	0.35	0.038	0.11	1.00	0.33	0.19scB	--		
IR 14229+1425	0.61	-	--	0.18	0.41	1.24	0.092	0.23	1.00	0.70	0.28	0.29		
IR 14341+3017NW	0.30e	0.11	0.15	0.13	0.048	0.15	0.076	0.18	1.00	0.53	0.28	0.26		
IR 14341+3017SE	0.15e	0.17	0.20	0.19	0.018	0.049	0.023	0.17	1.00	0.50	0.14	0.12		
IR 14416+6618	0.30	0.18	0.18	0.18	0.12	0.37	0.041	0.10	1.00	0.31	0.14	0.11		
IR 15206+3342	0.31	--	--	0.19	0.17	0.54	0.036	0.074	1.00	0.22	0.10	0.080	[26]	
*IR 15304+3017	0.16	--	--	0.18	0.95	2.72	0.14	0.33	1.00	0.98	0.26	0.22	[27]	
*IR 15312+4236	0.13	0.16	0.14	0.051	0.13	0.020U	0.15	1.00	0.45	0.20	0.17			
*IR 15324-3203	0.078	0.091	0.096	0.093	-	0.047u:	0.055	0.16	1.00	0.48	0.18	0.13		
*IR 15358+3831	--		--	--	--	0.12u:	0.090u	0.27	1.00	0.81	0.23	0.25		
*IR 15359+3139	0.21:t	--	--	0.10	-	0.053	0.039	0.20	1.00	0.61	0.15	0.12		
*IR 15364+3320	0.22	0.28	0.25	-	0.083	0.024u:	0.12	1.00	0.37	0.12	0.11nB			
*IR 15384+3841	0.15:t	0.12	0.15	0.14	-	0.062	0.028	0.11	1.00	0.35	0.12sa	--		
*IR 15391+3214SW	0.20	0.12	0.12	0.12		0.030	0.024	0.16	1.00	0.49	0.12	0.11	[28]	
*IR 15391+3214NE	--	0.12	0.12	0.12		0.018	0.039	0.14	1.00	0.42	0.14	0.10	[29]	
*IR 15394+3532	0.39	0.21	0.32	0.24	--	0.14	0.021	0.10	1.00	0.31	0.14	0.10nA		
*IR 15404+3228	0.30	0.062	0.064	0.063		0.097	0.077	0.20	1.00	0.59	0.14	0.088	[30]	
*IR 15414+3238	0.26	-	0.14	0.036	0.088	0.040nA	0.19	1.00	0.57f	--	--	out		
*IR 15418+3938	--	0.066	0.11	0.081	0.022u	0.020	0.13	1.00	0.38	0.32s	-			
*IR 15418+2840	0.16	-	0.22	0.73	2.15	0.11	0.28	1.00	0.80	0.20	0.20	0.20	[31]	
*IR 15440+2834	0.14	0.18	0.15		0.085	0.031	0.10	1.00	0.32	0.19	0.14	0.14	[32]	
*IR 15445+3312	0.85	-	0.16	0.070	0.14	0.22	0.30:	1.00	0.88:a	0.31	0.24			

**Table 2b. Observed Emission Line Fluxes - Warm IRAS Galaxies**

Name	[OII] 3727	H <sub>β</sub> splot specfit	[OIII] 4959 5007	[OI] 6300	[NII] H <sub>α</sub> [NII] 6548 6563 6583	[SII] 6716	[SII] Other 6731 Lines						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
● IR 15463+4131	—	0.19	0.21	0.20	-	0.047	0.034	0.14	1.00	0.43	0.14	0.10	
*IR 15469.X53	—	—	—	0.058u	---	0.091	—	0.20	1.00	0.60	0.19	0.14	
*IR 15481-2920	—	0.14	0.16	0.15	0.16	0.34	0.050	0.28	1.00	0.84	0.10nA	0.08nA	
*IR 15483-1227	—	0.20	0.25	0.23	0.045	0.087	0.026	0.12	1.00	0.37	0.30;sa	—	
*IR 15514-3330	—	—	—	0.15	0.044	0.097	0.032	0.15	1.00	0.44	0.16	0.14	
*IR 15519-3537	0.16	—	—	0.095	—	0.071	0.072	0.17	1.00	0.52	0.13	0.086	[33]
● IR 15534-3004	—	—	—	—	—	..	0.16:	0.37	1.00	1.10	0.54;sa	—	
*IR 15534-3519	0.17u	0.26	0.30	0.27"	—	0.14	0.093nB	0.14	1.00	0.43	0.27sa	—	
*IR 15535+2854	—	—	—	0.12	---	0.027u	0.021u	0.16	1.00	0.47	0.094	0.070	
*IR 15543-4158NW	0.17	—	—	0.14f	—	0.10	0.062	0.19	1.00	0.56	0.27:sc	—	
*IR 15543+4158SE	0.27	—	—	0.19 f	0.068	0.16	0.053	0.12	1.00	0.37	0.43:SC	—	— [34]
*IR 15s42-.3013	0.55	—	—	0.30	0.21	0.61	0.0250	0.070	1.00	0.21	0.10	0.078	[35]
● IR 15545-\$000	2.22	—	—	0.20	0.052	0.15	0.026	0.21	1.00	0.62	0.11:cA	0.11:cA	
*IR 15549-1201	0.57f	0.21	0.23	0.22	0.094	0.29	0.037	0.16	1.00	0.47	0.16	0.14	
*IR 15569 +2807W	—	—	—	0.10	—	0.077:	0.095u	0.19	1.00	0.71	0.24	0.16	[36]
● IR 15569+2807E	—	—	—	0.18:	0.67	1.95	0.15	0.28	1.00	0.86	0.26	0.23	[37]
*IR 15577-3816	—	—	—	—	—	—	—	—	—	—	—	—	out
*IR 15589-4121	0.48u	—	—	0.31	—	1.00f	0.13u	0.055	1.00	0.16	0.40:s	—	
*IR 15597-3133	—	—	—	—	—	0.19u	0.28	0.17	1.00	0.50	0.33a	0.29a	
● IR 16007-3743	0.30	—	—	0.10	0.039	0.095	0.073	0.17	1.00	0.52	—	—	out
IR 16130-2725	—	—	—	0.17	0.099	0.21	0.022U	0.11	1.00	0.35	0.20s	—	
Zw 052.015	—	0.12	0.13	0.13	0.020	0.061	0.019	0.13	1.00	0.40	0.19	0.15	
*IR 21479-1305	—	—	—	—	—	—	0.092u	0.24	1.00	0.72	0.36	0.39	
*IR 21484-1314	—	0.080	0.074	0.076	0.048	0.08e	0.031	0.13	1.00	0.39	0.24:sa	—	
● IR 21549-1206NW	--	0.18	0.25	0.21	0.094	0.29	0.066	0.11	1.00	0.33	0.24	0.19	
*IR 21549-1206SE	0.34:t	—	—	0.25	0.094	0.26	0.044	0.12	1.00	0.35	0.19	0.15	
*IR 22114-1109	0.17	—	—	0.18	0.25	0.76	0.077	0.21	1.00	0.62	0.19	0.18	
● IR 22152-0227	0.22	—	—	0.13c	0.33	1.02	0.13	0.22	1.00	0.67	0.48s	—	
*IR 22191-1400	--	0.092	0.12	0.11	—	0.032	0.050	0.18	1.00	0.53	0.23sa	—	
● IR 22193-1217	—	—	—	0.15	0.016	0.042	0.042	0.14	1.00	0.46	0.096	0.080	
IR 22199-0345	0.16	—	—	0.16	0.21	0.67	0.063	0.21	1.00	0.62	0.15	0.15	[38]
*IR 22204-0214NW	0.25	—	—	—	0.100,0.053U	0.085	0.060	0.18	1.00	0.54	0.31:sc	—	
● IR 22204-0214SE	0.13	—	—	0.14	—	0.037	—	0.15	1.00	0.44	0.15:sc	—	
*IR 22213-0238	—	—	—	0.086	—	0.029u	0.032	0.15	1.00	0.46	0.16	0.12	
● IR 22220-08057u	0.11	0.16	—	0.13	—	0.039	0.041	0.21	1.00	0.64	0.17	0.14	
*IR 22225-0545	0.10	0.14	—	0.12	—	0.055f	0.043nB	0.18	1.00	0.54	0.11	0.14	
*IR 22279-1112NW	0.35	—	—	0.15	0.072	0.29	0.0690	0.093	1.00	0.28	0.12	0.10	
● IR 22279-1112SE	--	0.029u	0.11	0.067u	—	0.14:u	0.34:nB	0.27	1.00	0.81	0.34	0.26	
*IR 22283-1439	—	0.055	0.081	0.064	—	0.026:	0.053	0.23	1.00	0.69	0.18	0.14	
*IR 22338-0015	—	—	—	0.11	0.046	0.11	0.029	0.20	1.00	0.59	0.12	0.17	
*IR 22343-0840	—	—	—	—	—	0.18:nB	0.25	1.00	—	0.75	0.16nA	0.17nA	
*IR 22381-1337	0.20	—	—	0.20	—	0.37	0.023	0.082	1.00	0.25	0.12	0.084	[39]
IR 22472-3439	—	0.16	0.22	0.18	0.038	0.17	0.056	0.14	1.00	0.41	0.44sc	—	

### Notes for Tables 2a, 2b

\* = observed under photometric condition.

: = flux value uncertain.

; = flux value very uncertain.

a = near atmospheric absorption “A” or “B” band.

c = corrected for the presence of the atmospheric “A” or “B” band.

e = near edge of the frame, the flux of this line is unreliable.

f = near edge of the frame, the flux of this line is reliable.

n = data from NED.

out = H $\alpha$  and/or [S II]  $\lambda\lambda$  6716, 6731 arc outside of the spectral coverage.

s = unable to deblend [S II]  $\lambda\lambda$  6716, 6731; listed flux is the flux of the blend.

S 1 = Seyfert 1 galaxy, the listed fluxes are those in the narrow component of the emission lines.

t = flux derived after smoothing.

u = upper limit

[1]: 0.063 [N I]  $\lambda$  5199

[2]: 0.014 [Ne III] 3869; 0.024 [Ne III] 3967; 0.008 [N I]  $\lambda$  5199; 0.002 [Fe III] 5270; 0.038 He 15876; 0.022 [Ar III] 7135; 0.015 [O II] 7325.

[3]: 0.035 HeI 5876; 0.021 HeI 6678; Main galaxy.

[4]: 0.057 HeII 4686; 0.026 [N I]  $\lambda$  5199; 0.14 [Fe VII] 6087; 0.11 [Ar III] 7135; deblending of H $\alpha$  and [N II] is unreliable

[5]: NGC 1143/44 SE

[6]: wrong velocity in BGS (Soifer et al. 1989).

[7]: 0.005 [N I]  $\lambda$  5199; 0.010 HeI 6678; 0.009 HeI 7065; 0.018 [Ar III] 7135; 0.015 [O II] 7325.

[8]: 0.005 [N I]  $\lambda$  5199; 0.009 HeI 6678; 0.017 [O II] 7325; 0.006 [Ni II] 7378.

[9]: H $\alpha$ , H $\beta$  line profile show blueward asymmetry. Possible broad wings to Balmer lines.

[10]: 0.030 HeI 5876; 0.010 HeI 6678; 0.015 [Ar III] 7135; 0.009 [O II] 7325

[11]: wrong velocity in BGS sample.

[12]: 0.35 [S III] 9069

[13]: 0.012 [Ar V] 7006; 0.007 He 17065; 0.015 [Ar III] 7135; 0.018 [O II] 7325.

[14]: 0.024 [Ar III] 7135; 0.053 [O II] 7325.

[15]: 0.027 HeII 4686; 0.030 [Ar III] 7135; 0.012 [O II] 7325.

[16]: 0.004 HeI 6678.

[17]: O 0.006 [N I]  $\lambda$  5199; 0.044 HeI 5876; 0.011 HeI 6678; 0.008 HeI 7065; 0.023 [Ar III] 7135.

[18]: 0.012 HeI 5876; wrong vel. in NED

[19]: 0.29 He 15876

[20]: 0.029 He 15876

[21]: 0.23 [Ne III] 3869; 0.071 [Ne III] 3967; 0.039 [Fe V] 4071; 0.041 [O II] 4363; 0.072 He 114686; 0.051 [Fe VII] 6087; 0.065 [Ar III] 7135; [O II] 7325.

[22]: 0.007 He 14472; 0.006 [N I]  $\lambda$  5199; 0.014 He 16678; 0.008 He 17065; 0.023 [Ar III] 7135; 0.022 [O II] 7325; 0.006 [Ni II] 7378; [Ar III] 7751.

[23]: wrong velocity in NED, correct velocity is 5916 km s $^{-1}$ .

[24]: 0.17 [Ne III] 3869; 0.029 He 13889; 0.043 He 114686; 0.009 [N I] / 15199; 0.025 He 15876.

[25]: 0.069 [S III] 9069; 0.086 [S III] 9532.

[26]: 0.023 [Ne III] 3869; 0.015 He 13889; 0.016 [Ne III] 3969; 0.010 He 16678.

[27]: 0.11 [Ne III] 3869; 0.044 [Fe V] 4071; 0.046 [O II] 4363; 0.072 He 114686; 0.036 [N I]  $\lambda$  5199; 0.041 [Fe VII] 5721; 0.049 [Fe VII] 6087; 0.077 [O II] 7325.

[28]: 0.020 He 15876

[29]: 0.25 He 15876

[30]: 0.017 He 15876

[31]: 0.002 He 15876; 0.045 [Ar III] 7135.

- [32]: 0.015 [Ar III]7135.
- [33]: 0.041 He 15876
- [34]: 0.025 He 15876.
- [35]: **0.047** [Ne III]3869; 0.038 He 13889; 0.007 [N I]  $\lambda$ 5199; 0.040 He 15876; 0.012 He 16678.
- [36]: 0.044 He 15876.
- [37]: **0.023** He 15876.
- [38]: **0.014** He 114686; 0.011 He 16678.
- [39]: 0.019 [Ne III]3869; 0.016 He 13889; 0.036 He 15876; 0.015 He 16678.

**Table 3a. Absorption Properties, Continuum Levels, and [OIII] Line Widths - IRAS Bright Galaxies**

Name	EW(H <sub>β</sub> ) Absorption(Å)	Balmer Absorption	EW(Mg IIb) (Å)	EW(Na ID) (Å)	C4861 (erg s <sup>-1</sup> cm <sup>-2</sup> Å <sup>-1</sup> )	C6563 (Å <sup>-1</sup> )	FWHM([OIII]) (km s <sup>-1</sup> )
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NGC 23	4.85	yes	2.64	3.82	7.71e-15	7.42e-15	—
*NGC 34	2.61	yes	0.90	7.85	3.42e-15	3.58e-15	310
*MCG-0201051S	—	—	—	2.59	7.78e-16	7.49e-16	—
*MCG-0201051N	—	no	..	1.20	3.09e-16	2.50e-16	80
*NGC 232	3.33	yes	1.25	12.3	1.36e-15	2.20e-15	120
*UGC 556	3.57	yes	1.62	3.18	5.91e-16	9.70e-16	—
*IC 1623N	2.72	yes	1.25	0.90	4.06e-15	2.53e-15	400
*IC 1623SE	—	no	—	—	1.92e-15	1.23e-15	—
*MCG-0304014	1.91	yes	0.42	7.96	6.89e-16	1.09e-15	—
*MCG-0204025	2.53	yes	1.16	1.84	3.63e-16	3.21e-16	—
*UGC 903	4.87	yes	2.30	3.50	8.06e-16	1.23e-15	260
*NGC 520	6.97	yes	1.85	1.50	1.05e-15	1.44e-15	—
*IR 01364-1042	..	yes	0.62	2.20	1.32e-16	1.31e-16	—
*NGC 660	—	yes	1.57	5.80	9.37e-16	3.06e-15	150
*III Zw 35s	5.65	yes	0.70	2.97	8.50e-16	9.95e-16	—
*111 Zw35N	—	no	1.19.	2.09	2.18e-16	1.78e-16	—
*NGC 695	3.91	yes	0.46	4.37	9.05e-16	1.14e-15	—
*NGC 873	3.63	yes	1.47	4.01	1.94e-15	2.05e-15	—
NGC 1050	1.25	—	0.98	3.82	3.09e-15	3.16e-15	150
NGC 1056	3.48	yes	1.71	3.25	6.86e-15	7.71e-15	—
*NGC 1068	—	no	2.47	1.47	4.57e-14	4.81e-14	1000
*NGC 1083	—	—	0.62	3.92	5.50e-16	7.52e-16	—
*UGC 2238	—	—	2.13	4.48	2.72e-16	4.98e-16	—
*IR 02438-2122	4.27	yes	0.72	8.08	3.64e-16	6.23e-16	890
*UGC 2369	—	no	0.23	2.81	8.75e-16	9.10e-16	310
NGC 1143/44	4.31	yes	6.12	5.41	1.82e-15	2.61e-15	170
*UGC 2403	1.53	—	1.12	5.46	5.48e-16	1.05e-15	260
NGC 1204	3.43	yes	1.22	4.24	9.11e-16	1.54e-15	—
NGC 1266	6.10	yes	2.11	5.21	1.75e-15	2.79e-15	480
NGC 1377	4.67	yes	2.10	3.25	2.91e-15	3.64e-15	—
IR 03359+1523	—	no	0.69	0.21	3.91e-16	3.35e-16	—
UGC 2982	2.38	yes	1.25	4.36	5.54e-16	1.24e-15	550
ESO 550-JG025S	5.38	yes	1.34	5.50	5.16e-16	6.75e-16	—
ESO 550-JG025N	6.34	yes	1.54	3.71	2.52e-16	3.67e-16	830
NGC 1614	—	no	0.31	6.26	4.41e-15	6.81e-15	310
IR 042.35-2524	5.57	yes	1.97	3.19	6.78e-16	8.78e-16	900
ESO 485-G003	2.18	yes	1.07	2.53	1.30e-15	1.22e-15	120
IC 398	4.70	yes	1.67	4.12	1.35e-15	1.91e-15	460
NGC 1797	3.14	yes	0.81	5.71	2.02e-15	2.41e-15	410
IR 05186-1017	7.25	yes	1.89	3.80	2.20e-16	3.46e-16	—
IR 05189-2524	3.08	yes	0.88	4.37	1.01e-15	8.55e-16	540
NGC 2388	3.05	yes	0.97	8.30	1.61e-15	2.65e-15	120
IR 08339-f517	1.63	yes	0.88	1.79	6.18e-15	4.14e-15	80
NGC 2623	5.30	yes	1.37	3.79	1.31e-15	1.51e-15	640
IR 08572 -?915	—	no	1.73	3.16	5.74e-17	4.03e-17	380
NGC 2785	—	no	0.47	5.71	4.82e-16	9.04e-16	—
UGC 4881SW	2.62	yes	0.65	4.86	7.01e-16	9.43e-16	670
UGC 4881NE	4.75	yes	2.57	5.47	1.07e-15	1.29e-15	950
UGC S10!	4.30	yes	1.68	5.24	9.59e-16	1.23e-15	240
MCG-0818912	5.61	yes	1.15	3.44	5.06e-16	5.79e-16	490

**Table 3a. Absorption Properties, Continuum Levels, and [OIII] Line Widths - IRAS Bright Galaxies**

Name	EW(H <sub>β</sub> ) Absorption(Å)	Blue Absorption	Balmer EW(Mg Ib) (Å)	EW(Na II) (Å)	C4861 (erg s <sup>-1</sup> cm <sup>-2</sup> Å <sup>-1</sup> )	C6563 (Å)	FWHM([OIII]) (km s <sup>-1</sup> )
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NGC 3110	—	yes	0.67	4.80	1.21e-15	1.47e-15	—
*IR 10565 +2448Main	—	no	0.99	9.47	4.15e-16	6.19e-16	—
*IR 10565 +2448SE	—	no	1.29	4.73	1.11e-16	1.12e-16	—
NGC 3508S	—	yes	1.11	2.67	8.63e-16	8.30e-16	80
NGC 3508N	—	yes	1.12	3.49	8.39e-16	1.07e-15	—
NGC 3597	2.50	no	0.67	3.64	4.42e-16	3.99e-16	670
MCG+0029023	3.08	yes	2.05	9.55	1.03e-15	1.54e-15	660
*UGC 6436NW	1.89	no	2.20	4.94	2.28e-16	3.39e-16	—
*UGC 6436SE	—	no	2.58	4.67	3.88e-16	5.01e-16	—
*IR 12224-0624	5.81	yes	—	2.21	1.06e-15	1.28e-15	120:
*NGC 4666	2.77	yes	3.49	4.16	4.58e-15	7.19e-15	400
IC 3908	—	no	2.67	3.38	1.39e-16	4.25e-16	—
UGC 8058	—	no	—	22.6	5.88e-15	5.55e-15	—
*NGC 4922	—	no	2.05	5.90	3.09e-16	4.53e-16	500
MCG-0233098W	5.30	—	2.45	13.1;	2.28e-16	2.66e-16	1910;
MCG-0233098E	5.46	—	1.82	7.43	2.43e-16	3.00e-16	—
*IC 860	5.65	—	0.74	3.91	1.11e-15	1.41e-15	—
*UGC 8335NW	—	no	0.91	3.08	5.89e-16	5.44e-16	630
*UGC 8335SE	—	no	0.54	2.55	5.70e-16	6.24e-16	—
*UGC 8387	2.30	yes	1.08	3.16	4.82e-16	5.55e-16	350
*NGC 5104	1.74	—	2.37	5.38	6.61e-16	1.08e-15	260
*NGC 5218	3.30	yes	1.87	7.59	6.75e-16	1.52e-15	—
*NGC 5256SW	—	no	2.53	1.88	9.67e-16	9.57e-16	530
*NGC 5256NE	—	no	1.27	2.30	5.21e-16	7.15e-16	350
*NGC 5257	3.23	no	1.58:	2.05	4.93e-16	3.69e-16	—
*NGC 5258	5.20	no	1.53	3.25	6.36e-16	7.97e-16	—
*UGC 8696	—	no	0.69	4.94	6.09e-16	6.62e-16	300
*NGC 5430	3.49	yes	1.93	6.15	2.39e-15	3.09e-15	190
*ZW 247.020	—	no	1.62	11.8	8.90e-16	1.09e-15	170
*NGC 5653W	3.54	no	—	0.91	9.49e-16	8.77e-16	170
*NGC 5653E	—	yes	2.45	4.57	2.71e-15	2.94e-15	—
*NGC 5676	2.50	yes	3.65	11.9	2.84e-15	3.58e-15	—
*IR 14348-1447SW	2.16	no	1.65	2.88	1.09e-16	1.60e-16	190
*IR 14348-1447NE	3.64	no	1.75	4.45	9.52e-17	1.11e-16	—
*NGC 5734	3.82	yes	2.10	7.34	2.12e-15	3.14e-15	—
*UGC 9618	—	—	0.65	4.75	1.94e-16	3.22e-16	190
Zw 049.057	—	no	0.97	3.66	6.18e-16	1.32e-15	—
*I Zw 107S	2.71	no	2.38	2.63	1.88e-16	1.95e-16	—
*I Zw 1074s	1.45	no	0.80	6.14	4.86e-16	5.29e-16	—
*IR 15250-3609	2.20	yes	1.33	1.45	4.32e-16	3.72e-16	150
*NGC 5936	—	no	1.21	6.94	9.59e-16	1.59e-15	420
*NGC 5953	—	no	1.38	7.51	5.29e-15	6.61e-15	210
UGC 9913W	4.86	yes	1.93	6.63	4.47e-16	5.23e-16	540
UGC 9913}	3.81	yes	2.19	4.90	4.91e-16	7.48e-16	690
*IK 15335-0513	—	no	1.29	4.75	1.53e-16	3.72e-16	460
*NGC 6090SW	—	no	0.81	1.38	8.15e-16	6.37e-16	—
*NGC 6090NE	—	no	1.15	2.35	1.66e-15	1.49e-15	—
*IR 16164-0746	3.71	yes	1.56	2.81	2.17e-16	2.94e-16	—
*MCG+0142088	6.11	yes	0.71	5.86	6.17e-16	1.14e-15	—
*NGC 6181	3.90	yes	2.93	6.81	3.12e-15	3.69e-15	120

**Table 3a. Absorption Properties, Continuum Levels, and [OIII] Line Widths - IRAS Bright Galaxies**

Name	EW(H <sub>β</sub> ) Absorption(Å)	Blue Absorption	Balmer EW(Mg Ib)	EW(Na I D)	C4861 (A)	C6563 (erg s <sup>-1</sup> cm <sup>-2</sup> Å <sup>-1</sup> )	FWHM([OIII]) (km s <sup>-1</sup> )
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
*NGC 6240	—	no	1.55	10.3	3.37e-16	8.52e-16	810
*NGC 6285/6NW	—	no	2.37	4.22	3.92e-16	5.33e-16	—
*NGC 6285/6SE	3.82	no	3.48	3.89	3.75e-16	5.24e-16	—
*IK 17132 +5313W	—	yes	1.91	11.0	2.19e-16	2.87e-16	—
*IR 17132+5313E	—	no	2.45	4.75	2.15e-16	2.69e-16	170
*IR 17 I38-10I7	—	no	2.59	6.70	6.48e-17	2.43e-16	—
*IR 17208-0014	—	no	0.57	9.28	1.08e-16	2.30e-16	—
*NGC 6621	2.77	yes	1.45	5.51	7.97e-16	1.10e-15	690
*IR 18293-3413	—	no	0.75	9.39	4.98e-16	1.14e-15	—
* NGC 6670W	6.52	no	1.79	4.36	1.45e-16	3.33e-16	—
*NGC 6670E	5.58	no	1.38	2.46	3.96e-16	6.43e-16	—
*NGC 6701	1.53	—	1.57	3.68	2.46e-15	3.33e-15	260
*ESO 593-IG008S	—	no	2.14	5.42	8.92e-17	9.56e-17	—
● ESO 593-IG008N	—	no	0.80	6.54	1.52e-16	2.02e-16	—
*IR 19297-0406	—	no	2.34	3.86	4.21e-17	7.36e-17	—
*NGC 6926	4.77	yes	4.57	4.71	1.71e-16	3.04e-16	—
*Zw 448 .020Main	—	no	0.87	1.37	1.32e-15	8.74e-16	—
*Zw 448.020NW	—	no	3.20	2.77	2.51e-16	2.84e-16	—
*ESO 286-IG019	2.58	—	0.89	1.49	5.70e-16	6.58e-16	—
*ESO 343-IG013S	—	—	1.10	4.12	3.84e-16	4.60e-16	80
*ESO 343-IG013N	3.16	no	—	4.44	5.34e-16	6.11e-16	190
● IC 5135	—	no	1.06	2.25	2.83e-15	3.25e-15	320:
*IC 5179	2.88	ycs	0.99	3.31	1.27e-15	1.53e-15	—
*ESO 602-G025	2.61	—	1.42	8.45	5.87e-16	1.05e-15	800
*ESO 534-G009	1.32	yes	1.55	4.29	1.61e-15	1.66e-15	—
*UGC 12150	5.81	yes	2.45	7.08	6.68e-16	1.39e-15	3 5 0
*IR 22491 -1S08	2.16	yes	0.91	1.83	3.66e-16	2.96e-16	—
*NGC 7469	—	no	0.13	0.17	1.43e-14	1.14e-14	220
*Zw 453.062	—	—	2.00	4.75	2.86e-16	4.49e-16	—
*Zw 475.0S6	3.19	yes	0.51	5.44	1.48e-15	1.73e-15	320
*NGC 7591	3.37	yes	2.86	5.93	9.52e-16	1.42e-15	150
* NGC 7592W	—	no	1.06	3.02	6.91e-16	8.88e-16	320
*NGC 7592E	0.79	yes	0.78	1.42	1.04e-15	7.72e-16	—
*NGC 7674	—	no	2.14	1.50	1.43e-15	1.65e-15	410:
*NGC 7679	2.35	yes	0.90	0.67	7.52e-15	5.81e-15	600
*NGC 7714	—	no	0.61	0.94	8.45e-15	5.67e-15	—
IR 23365-3604	6.45	yes	0.70	3.96	4.48e-16	4.63e-16	260
*NGC 7771 Main	3.30	yes	1.87	3.48	2.93e-15	2.31e-15	—
*NGC 7771S	—	no	1.83	2.11	7.89e-16	8.22e-16	—
*Mrk 331	2.37	yes	0.41	9.71	2.54e-15	2.95e-15	600

**Table 3b. Absorption Properties, Continuum Levels, and [OIII] Line Widths - Warm IRAS Galaxies**

Name	EW(H <sub>β</sub> ) Absorption(Å)	Blue Absorption	Balmer EW(Mg Ib) (Å)	EW(Na I) (Å)	ID	C4861 (erg s <sup>-1</sup> cm <sup>-2</sup> Å <sup>-1</sup> )	C6563 (km s <sup>-1</sup> )	FWHM([OIII]) (km s <sup>-1</sup> )
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
*NGC 985	3.62	yes	5.01	7.15	1.21e-15	1.63e-15	—	—
*IR 02433+1544	—	—	2.87	6.20	4.95e-16	1.03e-15	150	—
MCG+0310045	3.98	yes	1.48	3.71	4.73e-15	4.79e-15	—	—
*IR 04259-0440	3.81	yes	1.55	1.44	7.07e-16	8.07e-16	520	—
IR 07599+6508	—	no	—	—	9.42e-15	5.30e-15	—	—
IR 09209+3943	—	no	1.60	4.24	2.45e-16	2.30e-16	—	—
IR 09218+3428	—	no	0.68	1.80	1.80e-16	1.68e-16	—	—
IR 09245+3517	—	no	6.01	9.14	1.77e-16	1.91e-16	570	—
IR 09245+3300	6.41	no	3.11	2.85	6.27e-17	—	750	—
IR 09252+3124	—	no	1.01	2.51	9.95e-17	1.27e-16	530	—
IR 09268+2808	2.62	yes	1.27	5.35	2.25e-6	2.54e-16	—	—
Zw 238.066	3.09	yes	2.52	3.87	6.53e-6	7.58e-16	310	—
IR 09303+2736	—	yes	1.37	2.73	1.00e-6	1.35e-16	—	—
IR 09338+3133	1.91	yes	1.34	3.15	4.41e-6	3.96e-16	—	—
IR 09339+2835	—	no	1.25	4.88	1.34e-6	1.32e-16	170	—
IR 09399+2830	—	no	1.89	2.96	2.70e-6	2.84e-16	210	—
Zw 182.010	2.81	yes	1.98	5.12	4.97e-6	5.47e-16	220	—
IR 09425+1751	—	no	2.50	1.67	1.95e-6	1.72e-16	530	—
IR 09427+1929	—	no	1.11	1.79	8.01e-17	6.25e-17	120	—
IR 09433+1910	7.50	yes	—	5.52	5.20e-16	5.66e-16	—	—
*IR 10210+7528	1.51	no	1.19	3.48	1.07e-15	9.91e-16	150	—
IR 11571+3004	—	no	2.06	3.11	1.09e-16	1.31e-16	—	—
*IR 12071-0444	6.32	no	1.14	1.64	1.72e-16	1.86e-16	280	—
*Zw 04 1.073	2.51	yes	0.99	4.17	2.87e-15	3.28e-15	—	—
IR 12450+3401	—	—	1.92	3.24	4.31e-17	4.88e-17	880	—
IR 13349+2438	—	no	—	—	2.62e-15	1.99e-15	1230	—
●ZW 102.056	—	no	0.61	1.77	2.25e-15	2.43e-15	120	—
*IR 13446-1121	—	no	0.97	6.27	1.28e-15	1.98e-15	—	—
IR 14229+1425	—	no	no	3.45	2.36e-16	2.83e-16	—	—
IR 14416+6618	2.04	yes	1.33	1.89	6.15e-16	5.64e-16	—	—
IR 14341+3017NW	2.40	yes	0.97	1.44	8.18e-16	4.80e-16	410	—
IR 14341+3017SE	2.90	yes	1.24	2.49	4.83e-16	4.28e-16	—	—
IR 15206-3342	—	no	0.53	2.07	3.80e-16	3.26e-16	260	—
*IK 15304+3017	—	no	—	2.23	2.67e-16	3.01e-16	150	—
*IR 15312-4236	1.52	yes	0.29	2.53	6.13e-16	6.90e-16	220	—
*IR 15324-3203	—	no	0.65	6.35	8.60e-17	1.28e-16	710	—
●IK 15358-3831	—	—	0.38	2.69	1.09e-16	1.77e-16	—	—
*IR 15359-3139	3.18	yes	—	3.43	1.68e-16	1.84e-16	—	—
●IR 15361-3320	3.92	yes	—	1.33	5.58e-16	4.72e-16	80	—
*IR 15384-3841	5.02	yes	0.91	3.58	3.73e-16	4.03e-16	—	—
●IR 15391-3214SW	—	—	—	3.79	1.63e-16	1.96e-16	750	—
*IR 15391-3214NE	—	yes	—	2.52	9.19e-17	1.05e-16	—	—
*IR 15394-3532	—	—	1.10	1.53	1.01e-16	7.08e-17	350	—
●IR 15404-3228	3.55	yes	1.11	4.67	2.23e-16	2.46e-16	1020	—
●IK 15414-323S	—	no	0.61	4.15	3.45e-17	3.90e-17	—	—
●IK 15418-3938	3.75	yes	0.37	4.63	1.53e-16	2.08e-16	—	—
●IR 15418-2840	2.23	yes	2.21	2.54	7.78e-16	8.46e-16	—	—
*IR 15440-2834	4.73	yes	1.65	1.75	6.27e-16	5.54e-16	—	—
*IR 15445-3312	—	no	1.57	5.14	2.10e-17	2.27e-17	—	—

Table 3b. Absorption Properties, Continuum **Levels**, and [OIII] Line Widths - Warm IRAS Galaxies

Name	EW(H <sub><math>\beta</math></sub> ) Absorption(h)	B l u e Absorption	Balmer (Å)	EW(Mg Ib) (Å)	EW(Na ID) (Å)	C4861 (erg s <sup>-1</sup> cm <sup>-2</sup> Å <sup>-1</sup> )	C6563 (km S <sup>-1</sup> )	FWHM([OIII]) (km S <sup>-1</sup> )
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
*IR 15463+4131	3.60	yes	1.99	3.33	4.32e-16	4.38e-16	280	
*IR 15469+2853	—	no	—	4.03	3.01e-16	3.90e-16	490	
*IR 15481+2920	5.37	yes	2.18	2.81	5.99e-16	5.95e-16	410	
*IR 15483+4227	3.87	yes	0.45	1.25	6.21e-16	4.91e-16	—	
*IK 15514+3330	—		0.47	3.18	2.54e-16	2.55e-16	—	
*IR 15519+3537	—	no	0.91	4.47	2.56e-16	3.14e-16	430	
*IR 15534+3004	7.72	yes	2.55	6.13	1.39e-16	1.67e-16	—	
*IR 15534+3519	—	yes	2.92	3.35	5.49e-17	1.43e-15	—	
*IR 15535+2854	—	no	5.23	5.87	2.65e-16	2.62e-16	—	
*IR 15543+4158NW		yes	—	3.42	8.34e-17	9.77e-17	580	
*IR 15543+4158SE		yes	0.75	1.53	7.97e-17	7.16e-17	380	
*IR 15543+3013	5.12	no	0.22	0.23	2.40e-16	1.72e-16	—	
*IR 15545+4000	—		0.40:	1.30	3.82e-16	3.27e-16	—	
*IR 15549+4201	—	yes	0.28	1.09	1.74e-15	1.26e-15	220	
*IR 15569+2807W	—	no	—	3.30	8.49e-17	9.76e-17	—	
*IR 15569+2807E	2.10		1.21	4.12	1.78e-16	1.68e-16	80	
*IR 15577+3816	1.40	no	1.35	8.04;	2.23e-17	—	360	
*IR 15589+4121	3.07	yes	—	—	4.43e-17	5.18e-17	260	
*IR 15597+3133	—		—	1.34	2.40e-17	2.61e-17	—	
*IR 16007+3743	3.14	no	1.77	3.55	3.99e-17	4.20e-17	910	
IR 16130+2725		no	2.52	1.07:	3.40e-16	2.95e-16	—	
Zw 052.015	—	yes	1.61	3.19	1.38e-15	1.81e-15	—	
*IR 21479-1305	3.88	yes	1.50	2.48	7.23e-17	7.11e-17	300	
*IR 21484-1314	—	yes	5.71	5.27	1.44e-16	2.06e-16	—	
*IR 21549-1206NW	—	yes		1.65	1.39e-16	1.17e-16	—	
● IR 21549-1206SE	5.12			3.14	9.90e-17	1.50e-16	—	
*IK 22114-1109	—	no	—	3.06	4.86e-16	2.28e-16	120	
*IR 22152-0227	1.15	no	1.66	3.75	2.41e-16	2.84e-16	790	
*IR 22191-1400	5.08	yes	3.75:	4.59	1.52e-16	1.91e-16		
*IK 22193-1217		no	0.89	6.44	2.11e-16	2.44e-16		
IR 22199-0345		no	1.08	2.30	2.16e-16	2.73e-16	240	
*IR 22204-0214NW		no	2.34:	1.33	3.36e-17	3.83e-17	80	
*IR 22204-0214SE	—	no	2.91:	2.83	4.11e-17	4.83e-17		
*IR 22213-0228	—	no	2.79	5.12	1.17e-16	1.83e-16	—	
*IR 22220-0825	3.82	yes	1.15:	6.82	1.61e-16	2.08e-16	—	
*IR 22225-0645	3.45	yes	1.19	6.29	1.71e-16	1.71e-16	480	
*IR 22279-1112NW	—			0.97	1.15e-16	9.22e-17	—	
*IR 22279-1112S11	5.19	yes	1.14	4.72	1.11e-16	1.41e-16		
*IR 22283-1439	2.87			6.42	1.43e-16	2.13e-16		
*IR 22338-1015		no		4.92	1.70e-16	2.32e-16		
*IR 22343-0830	8.75	yes	5.22	6.84	1.32e-16	1.80e-16	—	
*IR 22381-1337	—	no	1.03	1.42	1.68e-16	1.05e-16	—	
IR 22472+3439		yes	2.72	2.45	1.49e-16	2.10e-16	400	

: = value uncertain

; = value very uncertain

















































